PMM

Precision Metal Molding

INCLUDING DIE CASTINGS MAGAZINE

APRIL
1955

devoted exclusively to:

DIE CASTINGS

INVESTMENT CASTINGS

PERMANENT MOLD CASTINGS

PLASTER MOLD CASTINGS

POWDER METALLURGY

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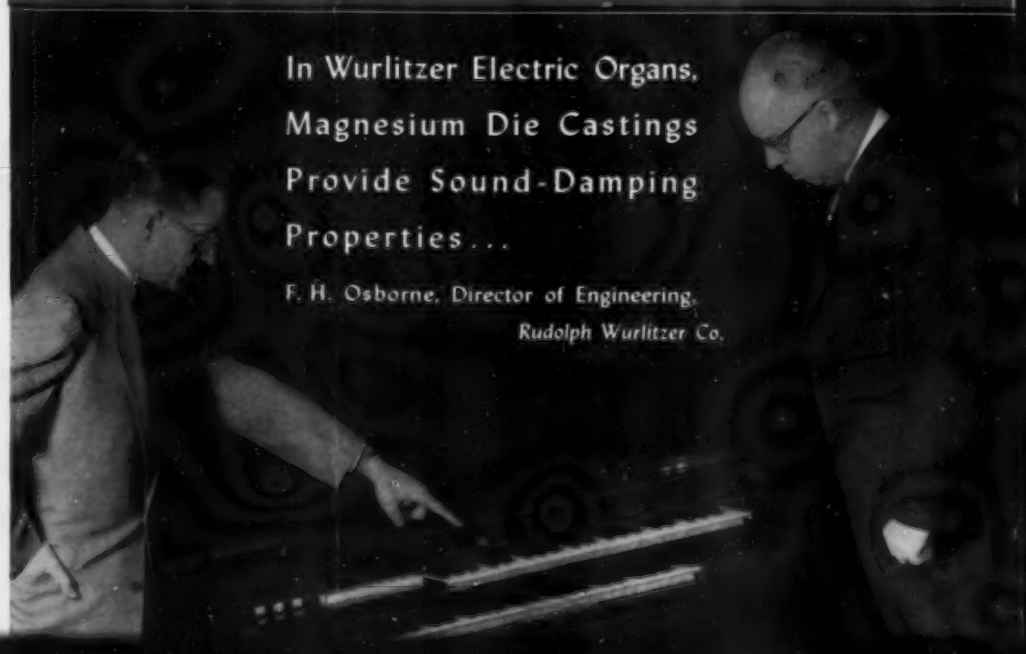

In Wurlitzer Electric Organs, Magnesium Die Castings Provide Sound-Damping Properties...

F. H. Osborne, Director of Engineering, *Rudolph Wurlitzer Co.*

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that always help you get better quality castings and trouble-free production

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- All ingot produced for die casting, permanent mold and sand casting requirements have superior working characteristics and are free from impurities and gas.
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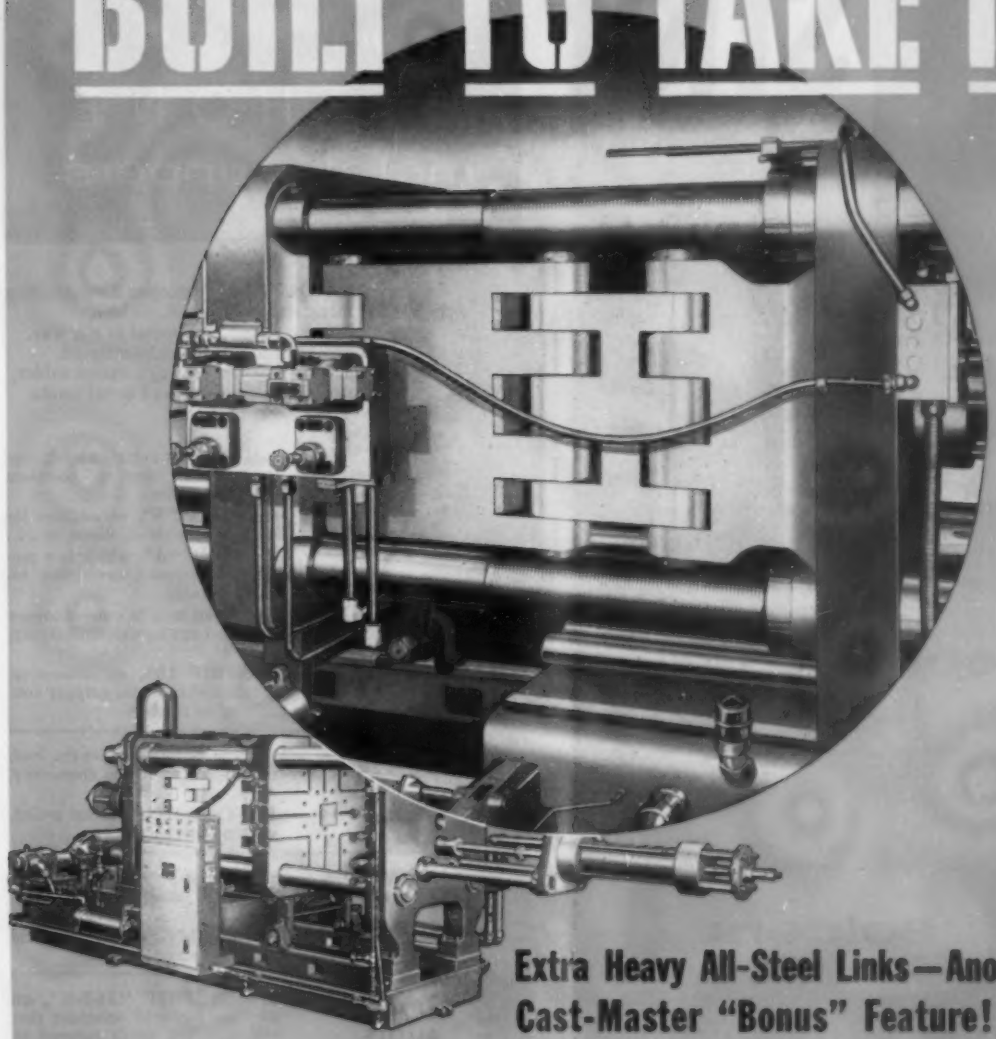

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COPPER ALLOYS	use **ENSTRIP "165-S"**, an additive for acid solutions that will give you quick removal of nickel, tin, zinc, lead or cadmium.
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** The Scientific Solution of Metal Finishing Problems*

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pmm

April 1955

Volume 13 Number 4

precision metal molding

DIE CASTINGS
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PLASTER MOLD CASTINGS
PERMANENT MOLD CASTINGS
POWDER METALLURGY
SHELL MOLD CASTINGS

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Pyramiding Design Talents

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Talented product designers are expert specialists in a given field. When such a product designer couples his knowledge with that of the seasoned and skilled Madison-Kipp die casting engineers, there is in effect a pyramiding of talents that is often extremely effective in getting maximum results.

In the companion parts here illustrated the advantages of the die casting process were utilized in full measure by such cooperative effort.

Please clip this ad as a reminder to contact us when you have die casting requirements.

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thanks to ACCUMET PRECISION INVESTMENT CASTINGS

This bolt-making machine transfer arm used to be machined from a forging of SAE 1045 steel. A grooved pin had to be machined and assembled in the forging, and many milling, broaching and drilling operations were needed to produce the finished part.

Then a Crucible ACCUMET® precision investment casting was tried, using heat-treated SAE 4140. Results? All machining except drilling and tapping two small holes was eliminated. Better functional design was achieved. A more rugged grade of steel was used. The manufacturer's machine tools were released for other jobs.

This is just one example of hundreds where ACCUMET precision investment castings have improved the design, function and performance of a component part — *with a reduction in cost.* It was possible because Crucible — the country's leading specialty steel producer — has established standards of quality and uniformity in its ACCUMET precision castings that are unsurpassed in the industry.

So look over the machining operations in your shop. Take an *extra* long look at the intricate products that are made in many costly, high-reject steps. Then let your Crucible representative show you how ACCUMET precision investment castings can help you lower costs and improve your products.

CRUCIBLE first name in special purpose steels

54 *years of Fine steelmaking*

ACCUMET INVESTMENT CASTINGS

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

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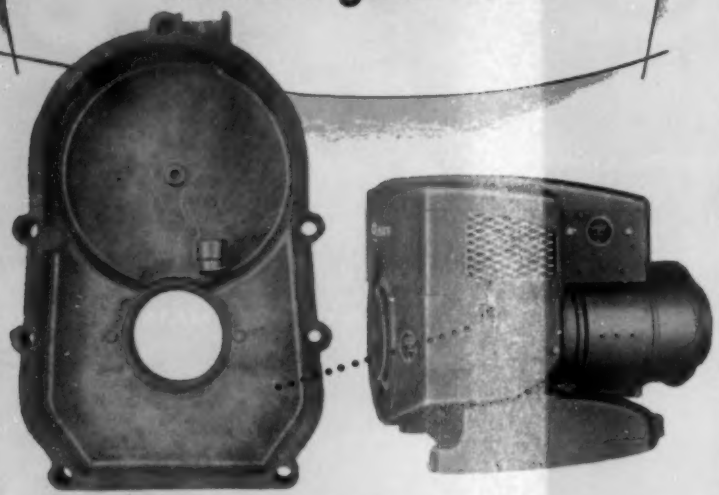
here's how TWIN CITY DIE helped Onan cut 19 machining operations off this gear case



Using sand casting methods, 31 expensive machining operations were necessary in manufacturing this Onan gear case. Machining operations were complex, time and handling costs were high. Costs had to come down.

Twin City cut the required machining operations to 12 by die casting the gear case and governor shaft boss in one operation. A loose core was inserted into the die before each "shot" to cast the double-diameter governor boss. Holding relative tolerances as close as .003 "over 6" eliminated many machining operations, simplified others. Result: far lower unit cost, far simpler machining—precision accuracy with production economy!

This Onan gear case is just one example of how Twin engineers and die casters work with you to cut your costs. Oldest die caster in the Upper Midwest, Twin City *keeps* its leadership because of its willingness and ability to look at every job through the customer's eyes.

Get the facts for yourself! Send us samples or blueprints and let us demonstrate Twin City service to you!

MACHINING OPERATIONS ON GEAR CASE

WITH SAND CASTING	WITH DIE CASTING	
17	0	Drilling
2	1*	Machining face
3	3	Ream rotor shaft holes (Tolerances: +.0003"—.0000; +.0005"—.0000"; +.001"—.000")
5	5	Tapping
2	1	Machining operations on main shaft bearing hole (Tolerance: +.000"—.001" I.D.; and +.001"—.000" O.D.)
2	2	Reaming dowel pin holes
31	12	

19 OPERATIONS ELIMINATED!

*Light sanding only.

TWIN CITY DIE CASTINGS CO.

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SOURCES

Could you kindly inform us who die casts bushings to be used in standard plastic knobs?

We are looking for a die caster who own the tools themselves and who would sell us the bushings in hundred and thousand lot quantities.—A.C.F.

We badly need to locate a source of supply for die cast hand wheels 1¾" to 2" diameter with 5/16" diameter stud and it has been suggested to us you are in a position to give us the names and addresses of several concerns whom we could contact.

The item we are looking for will be used on physicians' treatment room equipment and intravenous feeding stands and we would require about 1000 pieces per order, this quantity not being sufficiently large for having our own molds. Consequently, we need to know about sources who produce small parts and market them as their regular line.—J.A.M. (President)

We are manufacturers of aluminum grilles and of course, handle aluminum initials. Our initials at the present time are a sand molded process, but we are interested in contacting a reliable aluminum die caster who could manufacture aluminum initials and items of this kind.—S.M.R. (President)

We do not have lists of stock die casting dies for producing standard die castings, but will gladly forward the names of any die casters who can produce the castings described above. Where possible, we are glad to send names and addresses of sources. —Ed.

We are interested in obtaining the names of concerns from whom it would be possible to obtain standard cold chamber center gate sleeves and plungers for horizontal shooting on die casting machines. — L. T. T. (Purchasing Agent)

Information sent — Ed.

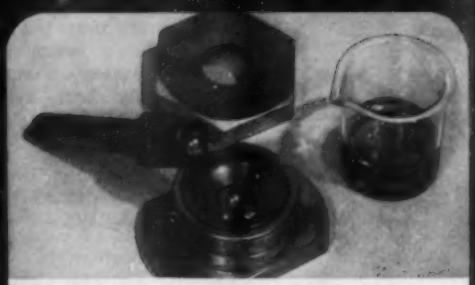
Continued on page 8

HYDRAULIC DANGER ZONE

Ordinary hydraulic fluid, escaping under pressure, can start a fire 40 ft. or more from a broken line! Is your plant safe? Here's how another firm protects men and machines inside the danger zone...

IT'S 1250° *HOT*... BUT HYDRAULIC LINES ARE SAFE WITH PYDRAUL!

MINNEAPOLIS-HONEYWELL REGULATOR CO.'s safety director reports: "Two weeks after we switched from flammable hydraulic oil to Pydraul F-9 in 7 die-casting machines, a line break sprayed Pydraul—at 1000 psi—into a pot of molten aluminum at 1250°F. With petroleum fluid there might have been a disastrous fire but with Pydraul there was no fire or loss of production time. Employees feel better knowing the fluid in our lines won't spread fire."



BETTER LUBRICANT THAN PETROLEUM OIL

In tests of *both* major lubricant requirements—film strength and resistance to wear—Pydraul outperforms petroleum oil! In Shell 4-Ball test using petroleum oil, scar diameters resulting from 90 lbs. pressure measured 2.71 mm. Using Pydraul, they measured only 1.08 mm.—less than half the wear!

To help *you*—we've put the WHY, WHERE and HOW Pydraul is being used in one complete new booklet. It covers such subjects as packings, paints, change-over, and reclaiming, etc. . . . for your FREE copy write Organic Chemicals Division, MONSANTO CHEMICAL COMPANY, Box 478-E-1, St. Louis 1, Mo.

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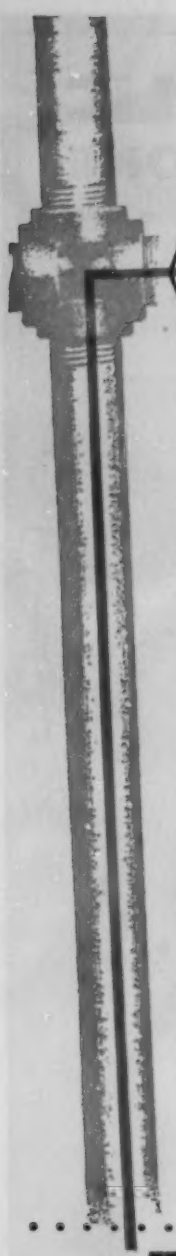

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UCON Hydrolubes are a *combination* of ingredients blended in balanced proportions for maximum safety, maximum efficiency, and easy maintenance—a synthetic lubricant, water, effective liquid and vapor phase corrosion inhibitors, special anti-wear agents, and an anti-freeze.

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LETTERS TO THE EDITOR
continued from page 6

INVESTMENT CASTING SALES

We are conducting an investigation into the field of Investment (Precision) Casting in order to ascertain whether this type of casting is applicable to any of our manufacturing operation. The writer is presently collecting such general information as may be available for incorporation into a general reference file for company use.

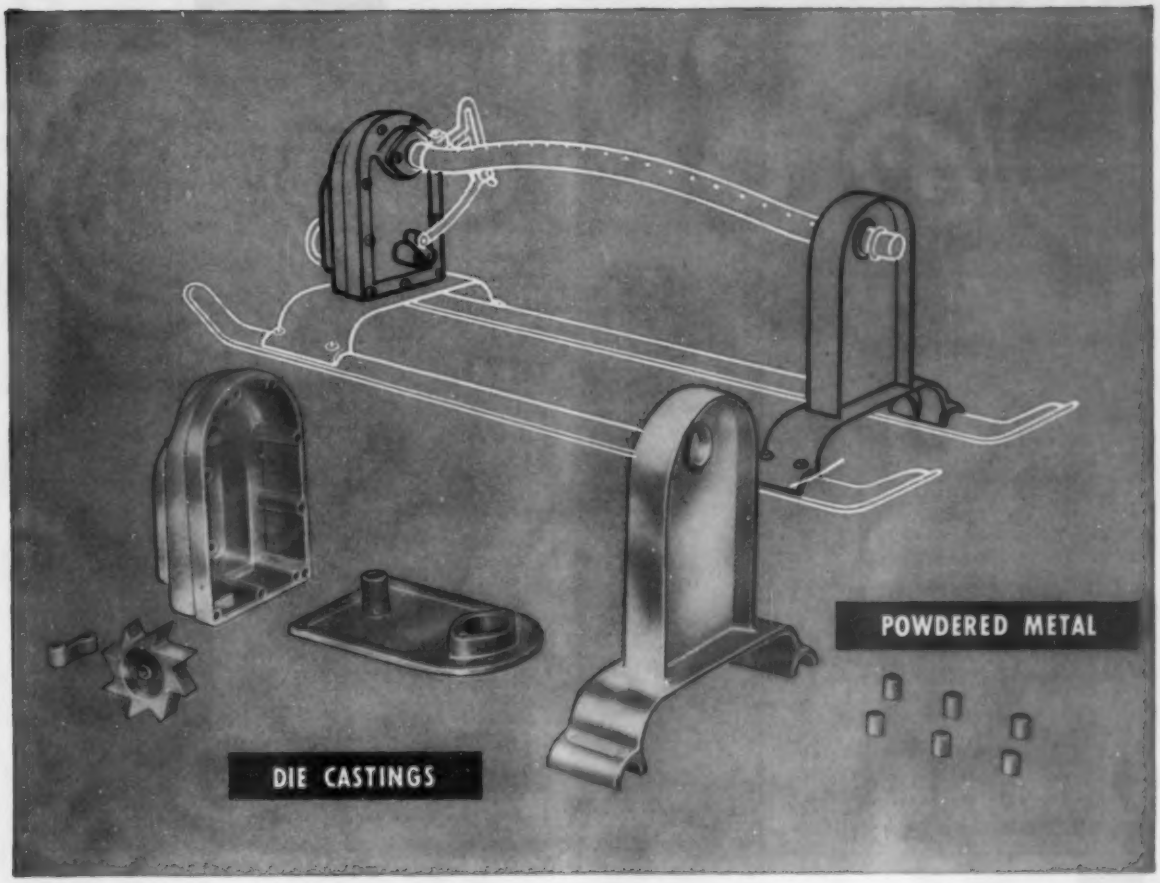
As a recent subscriber to your magazine PMM I would be interested to know if you have available an estimate of the approximate gross annual business done by the investment casting industry. If not, could you tell me if such figures are published and by whom?—D.O.M.

According to recently published figures, the total sales volume of the investment casting industry in 1953 was about $200 million dollars, which represents a vast growth over its 1948 sales of $75 million. While we do not have available any verified statistics on gross annual sales, the evidence is overwhelming that the industry has expanded enormously: 90 percent of the investment casting facilities have been established since 1945.—Ed.

PRODUCT STANDARDS . . . WELCOME NEWS

The publication of "Product Standards for Die Castings" is welcome news to many product designers. I believe your efforts will be fully appreciated. . . We wish to obtain about 12 copies of these standards, and I am asking if you could advise us how to get them. — K.L.M. (Design & Development)

The many requests for additional copies and for complete sets of standards that have come in as a result of PMM's announcement in March have been forwarded to the American Die Casting Institute who will send out copies without charge. — Ed.



PARKER USES 2 MEANS TO 1 *Lower Cost* END

Low cost—consistent with high quality—was the primary objective in producing important component parts for the popular lawn sprinkler made by Eastern Machine Products Inc. Parker gained this objective by making the end bracket, actuator housing, crank, and water wheel of aluminum die castings. The bushings inside the housing are bronze alloy sintered metal. The end result: component parts that meet every specification at lower cost.

This example emphasizes an important point about Parker service. No matter what your requirements in either die castings or powdered metal, Parker has the skill, experience and facilities to provide either or both. This undivided responsibility has saved money—and solved problems—for many users. Your problem may be one that Parker can solve in like manner. Just call the nearest Parker sales engineer listed at the left.

Parker White Metal Company • 2153 McKinley Ave., Erie, Pa.

PARKER **ALUMINUM and ZINC *die castings***

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BETWEEN THE LINES

IF THE BRONZES ARE NEEDED in your product, it will pay you to check the list of alloys and properties tabulated on page 49 showing the copper base alloys that are commonly permanent mold cast. An impressive range of alloys, from current production at five foundries, should be useful when you need the toughness, non-sparking, strength, accuracy or other qualities that can be derived from permanent mold cast bronze or brass.

CAST TOOLING may find many uses on today's production line, since it is a way of saving some of the expensive man hours of toolmaker's time. Investment cast molds for plastics are examples of this notion, clearly described in a step-by-step report on pages 38-39 of this issue.

WHEN VITREOUS ENAMELING of aluminum was first announced several years ago, the editors of PMM checked to see whether this process could be applied to aluminum in cast form. The answer was No. But the idea of an aluminum casting with a coating of glass apparently had enough merit to justify the extensive research program set up by a jobbing foundry. Now, after much development, the availability of vitreous enameled aluminum permanent mold castings is announced. First description of the potential uses, physical properties, and performance are presented in this issue of PMM beginning on page 60.

PMM's POWDER METALLURGY DIRECTORY, now in its fourth year, will be the highlight of our May issue. It will also contain a tabulation of properties of metal powders and compacts, brought up-to-date with the latest data from powder producers and fabricators. Every designer, buyer and producer of powdered metal parts will find it a useful reference source.

ERRATIC HARDNESS RESULTS, sometimes the bane of users of small investment castings in 410 stainless alloy, caused one midwestern jobbing investment caster to initiate a research program to remedy this situation. Result: a heat treating procedure which yields consistent hardness on 410 investment castings. The university professor who served as consultant on this investigation will offer a full report on this process in the May issue of PMM.

ARE YOU WASTING MONEY in your decorative paint spraying operation? It is surprising how many companies that know, down to the last fraction of a cent, the cost of every step in their manufacturing, are using outmoded painting methods that waste thousands of dollars each year. Some comments and suggestions for improving your paint spraying methods are presented beginning on page 65.

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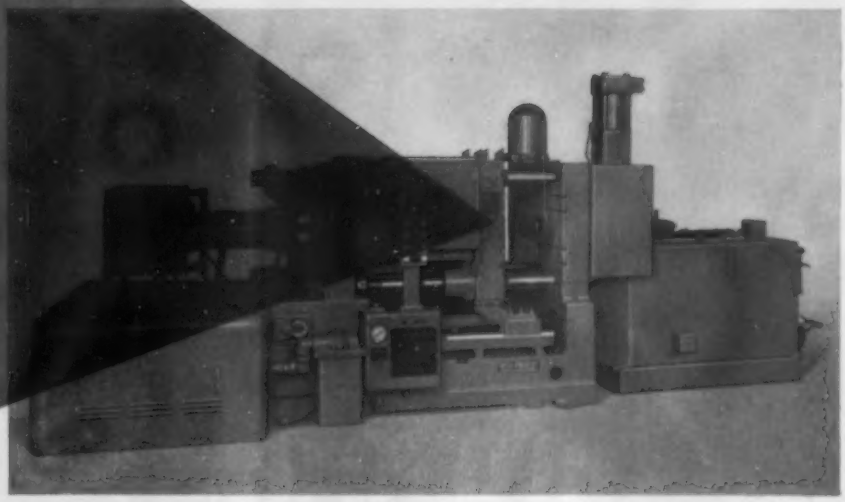

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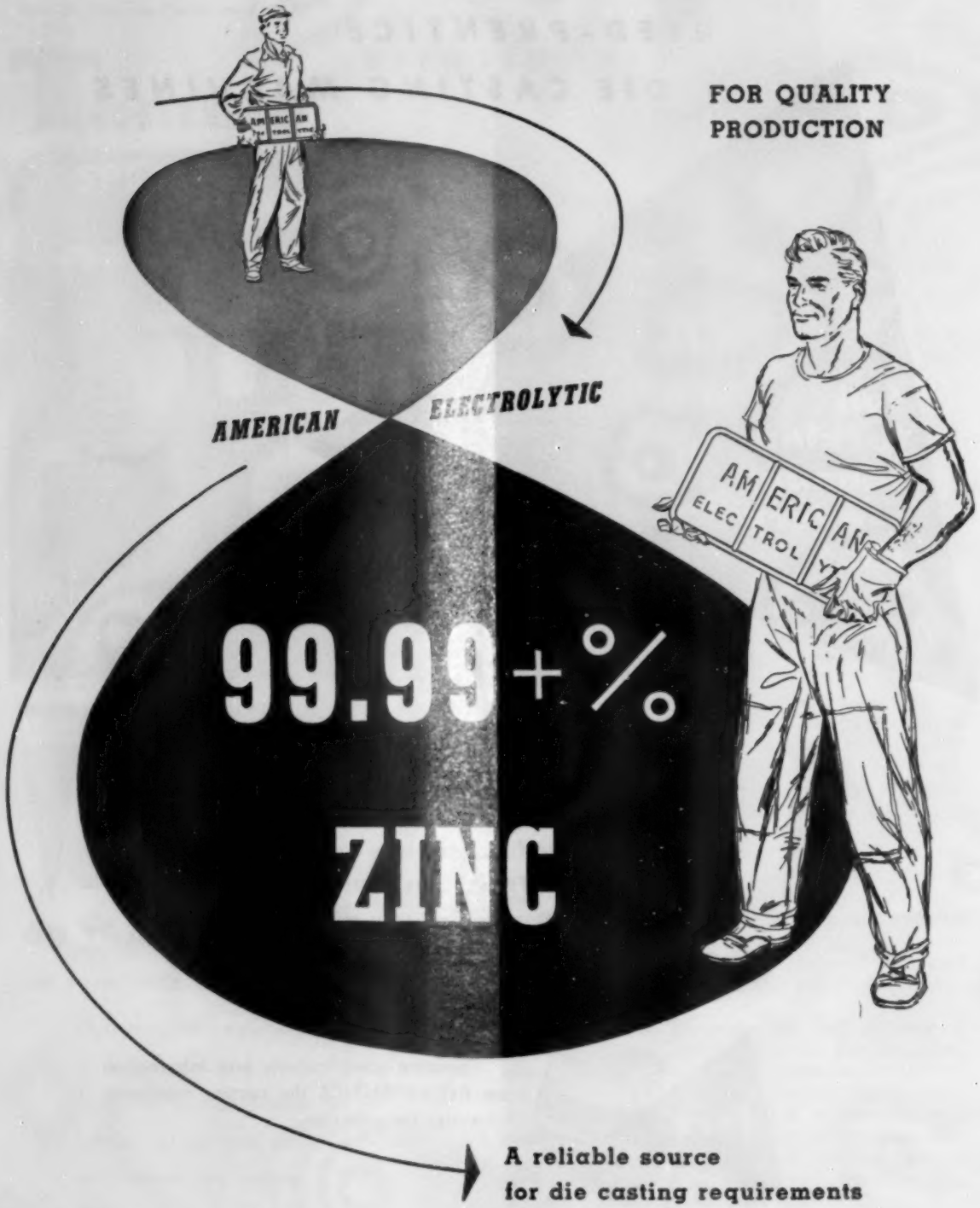

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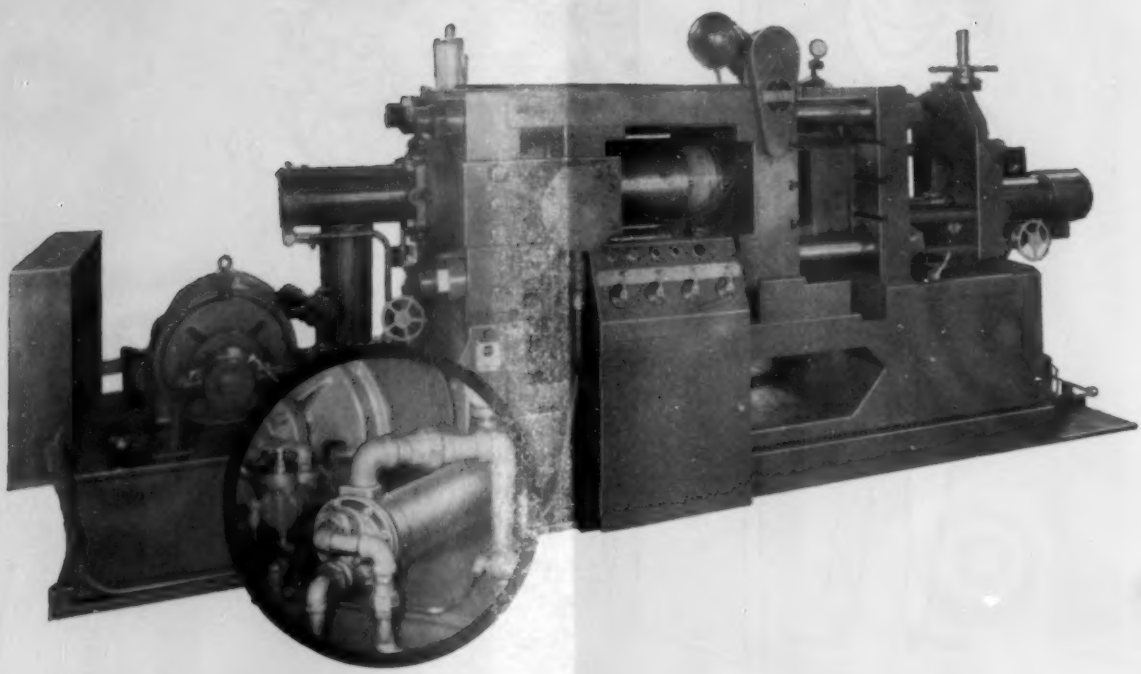
"Ross Exchanger important to efficiency of hydraulic system"

. . . SAYS CUYAHOGA



With a rated locking pressure of 500 tons plus, this Wedgelock Model A-32-10 Die Casting Machine has been designed to turn out aluminum castings weighing up to 7 lbs.

To insure full pump capacity of 17.5 gpm at 1000 psi, by preventing slippage from overheated, thinned oil, a Ross Type BCF Exchanger is furnished. It keeps hydraulic oil at proper temperature — "an important part in the efficient operation of the hydraulic system and the machine," says Cuyahoga Industries, manufacturer of Wedgelock machines.

Because of their extreme ruggedness and high thermal efficiency, Ross Type BCF Exchangers are regularly installed to safeguard performance of numerous types and makes of hydraulic machinery. Pre-engineered, fully standardized and constructed entirely of non-ferrous materials, they are stocked in a wide range of sizes to answer most requirements immediately.

For more details, request Bulletin 1.1K5.

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ECONOMY—Our process, combined with our new alloy, enables us to secure results which have been obtainable only by more expensive methods. Machining is reduced or completely eliminated. Scrap loss is reduced to a new low. Less shop equipment is needed. These add up to greater profits for you. What's more, in many instances the first costs of Alcaloy castings are lower than any other type casting.

Alcaloy, an alloy of aluminum, copper and other components, lends itself to a wide variety of products for commercial and specialized engineering purposes, including tools, utensils, machine parts, chain and fittings.

Alcaloy is cast in permanent molds by our own special process which produces castings uniformly close-grained, clean, sound throughout and free from cavities and surface flaws. All dimensions are held within specified tolerances. Experienced metallurgists test, analyze and supervise every phase of production.

Alcaloy is attractive and stays attractive. Its natural light gold-like bronze color remains free from tarnish and pitting . . . an ideal material where attractive appearance adds to fine quality.

Check these Alcaloy Features Today!

ECONOMICAL
NON-SPARKING
NON-MAGNETIC
CORROSION-RESISTANT
(except concentrated nitric acid)
UNIFORM

STRONG—Some grades of Alcaloy have the strength of steel and hardness of C 35-40. This strength is retained and utilized to the fullest extent in the casting process.

Send today for free catalog and information which will help you in specifying Alcaloy in your products.

ALCALOY, INC.
13124 Shaker Square • Cleveland 20, Ohio

Associated with
DICKEY INDUSTRIES

ALCALOY, INC.
13124 Shaker Square • Cleveland 20, Ohio

Gentlemen:
Please send free catalog A and information on the new Alcaloy casting Process to:

Name_____

Position or Title_____

Company_____

Address_____

City_____ Zone_____ State_____

For more information circle No. 10 on the Reader Service Card

DATA OFFERED IN THIS MONTH'S ADS

to get any of the free materials described here, circle the appropriate number on the reader service cards bound into this issue

1. HIGH SPEED fast cycling die casting machines, specifically for small parts are described and their advantages, space requirements, production rates, given in engineering reports from ABC Die Casting Machine Co.

3. MOLD LUBRICANTS of the colloidal dispersion type for both lubrication and insulation in permanent mold applications are discussed in Bulletin No. 426-W10 from Acheson Colloids Co.

7. SPHERICAL IRON POWDER for use in the manufacture of powdered iron cores is completely discussed in a 32 page book available from Antara.

10. HIGH STRENGTH, precision cast, non-ferrous parts, some having a hardness as high as 35-40 Rockwell C, are described and all of their properties listed in a new catalog released by Alcoloy, Inc.

12. TECHNICAL BULLETIN describing the alloys for investment casting and giving their chemistry, physical and mechanical properties in the as-cast state can be secured from Cannon Muskegon Corp.

13. HEAVY DUTY, fast cycling die casting machines in a wide range of capacities are described in the Cast Master, Inc. catalog with engineering reports and performance data sheets.

15. FIRE RESISTANT hydraulic fluids are fully described and their chemical and physical properties given in a new booklet issued by Carbide & Carbon Chemicals Div. of Union Carbide and Carbon Corp.

16. A COMPLETE CATALOG of die sets and mold and die parts has been published by Detroit Mold Engineering Co. Complete data and prices are included.

17. HOW PERMANENT MOLD casting can cut production costs by lessening or eliminating machining is told in literature available from Dostal Foundry & Machine Co.

19. STRIPPING METALS of platings, coatings, solders, etc. can be done faster and more economically with Enthone metal strippers. Complete reports on the applicability, economy, operation and other important factors are available from Enthone, Inc.

20. AUTOMATIC TAPPING with a super sensitive tapping head attachment for a drill press is described in Bulletin 22A from Ettco Tool.

22. LOW OXIDE METAL POWDERS specially prepared to withstand long storage periods are described and their properties listed in literature available from The Glidden Co.

23. VERY SMALL PARTS by the zinc die casting process produced by Gries Reproducer Corp. are covered in a manual available from the company.

26. PLASTER MOLD CASTING, its economies and applications are discussed in a new booklet from the Hale Foundry Co.

27. THE HENNING MESSENGER gives monthly information about zinc base and copper base alloys. The bulletin is the house organ of Henning Bros. & Smith, Inc.

28. DESCRIPTIVE BOOKLET of the Hoover Co., "Hoover Die Castings," gives information about the facilities of the company.

29. NEWLY DESIGNED die casting machine that allows faster die set-up, faster cycling, reduced maintenance and many other advantages is described in Bulletin 5400 from the Hydraulic Press Mfg. Co.

31. THIN OIL reduces die casting machine efficiency. How heat exchangers overcome this fault is told in Bulletin L-K5 from Kewanee-Ross Corp.

34. IMPROVED CONTROLS and redesigned injection system are two features of the new die casting machines described in Bulletin 103 from Lewis Welding & Engineering Corp.

35. DIE CASTING DESIGN is briefly, though thoroughly, treated in literature published by Litemetal Dicast.

36. MELTING FURNACES for permanent mold and sand casting of aluminum, magnesium, zinc and lead are described and full details given in bulletin No. 320 from Lindberg Engineering Co.

39. HANDLING HOT metal parts or trimmings calls for specially designed conveyor equipment. Bulletin MF-530, from May-Fran Engineering, Inc. describes conveyors for this service.

40. ADJUSTABLE SHOT CYLINDER with a total movement of up to 6" below center and many other new features are described in the latest Midwest Machine Co., Inc. catalog on a new 600 ton die casting machine.

42. PORCELAIN ENAMEL on aluminum castings is described in engineering reports that have been published by Monarch Aluminum Mfg. Co.

43. ETHYL SILICATES for bonding investment material are described and their properties and uses given in a bulletin from R. W. Greeff & Co.

44. FIRE RESISTANT hydraulic fluids, their properties, uses, and handling are described in a new booklet issued by the Monsanto Chemical Co.

45. LARGE & SMALL permanent mold castings, produced to close dimensional tolerances and with excellent surface finish by Michigan Wheel Co., are included in a brochure showing the company's facilities and equipment.

49. FINISHING DIE CASTINGS by the Cronak process is the first in a series of bulletins issued by The New Jersey Zinc Co.

50. HOBBED DIES: the hows, whys, and wherefores of die hobbing are discussed in a booklet issued by Newark Die Hobbing & Casting Co.

51. MOLDED POWDER PARTS from a wide variety of metals are described and a list of stock sizes and types of self-lubricating bearings given in a booklet from National Molded Products, Inc.

53. THE PRECISION STORY is the title of a booklet that has been prepared by Precision Castings Co., Inc. which describes the process of die casting, its advantages and how it can cut production costs.

54. COMPLETE SPECIFICATIONS and engineering operating data are contained in the Reed-Prentice die casting machine booklet.

60. LADLES FOR DIE CASTING are described and the range of standard sizes given, with prices, in a bulletin from Spincraft, Inc.

61. POWDER METAL PRESSES in a wide range of capacities and speeds are described and their physical data given in catalog No. 801 from the F. J. Stokes Machine Co.

63. METAL POWDER PARTS and where they can be used economically are the subject of a booklet, MP-532, prepared by the Metallurgical Products Div. of Thompson Products, Inc.

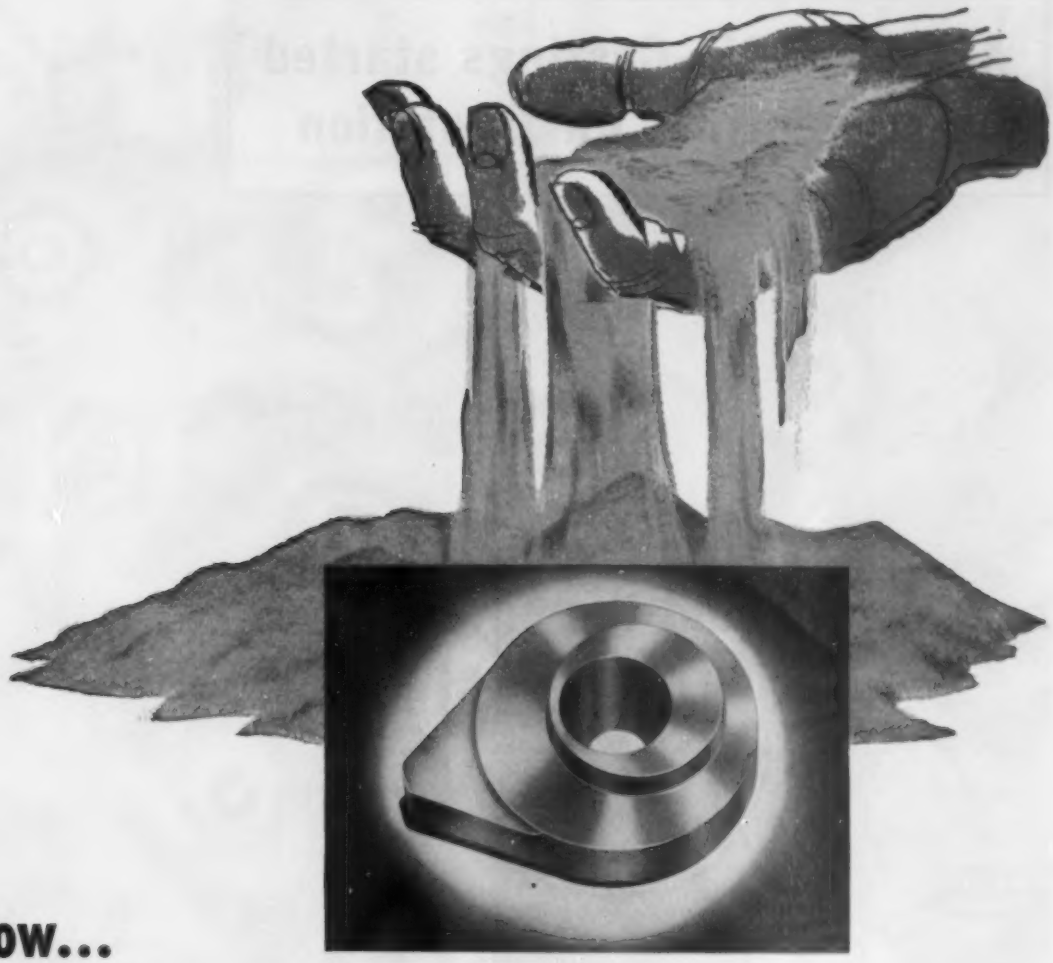
66. INJECTION MOLDING presses for making polystyrene patterns for investment casting and other injection molding of plastic materials is covered in bulletins from The Van Dorn Iron Works Co.

69. CUT PRODUCTION COSTS through the use of powdered metal parts. A booklet from Yale & Towne Mfg. Co., Powdered Metal Products Div. illustrates many cost saving parts and gives design information for the powder metal process.

71. ENGINEERING DATA and reports on the surface protection of zinc, aluminum and magnesium can be secured from Allied Research Products, Inc.

72. COLLET CONTROL by air power is discussed in a new bulletin issued by the Bellows Co.

Continued on page 85



Now...

from America's finest precision parts plant you can get Highest-Quality Powder Metal Parts

Your most rigid specifications for top-quality powder metal parts of all alloys can be met fully and promptly by the Metallurgical Products Division of Thompson Products. Our experience in producing millions of parts to commercial and aircraft tolerances enables us to supply accurate, properly engineered parts in large or small quantities at lowest prices compatible with highest quality. This engineering and metallurgical experience can help you redesign to fully utilize the strength and economy of powder.

Your present product... or one you plan to make... can probably benefit from savings and improvements made possible by using powder-metal parts.

Let us help you take full advantage of a shift to powder metal parts. We'll be glad to advise on engineering and design. To find out more about Thompson's facilities, write for Booklet MP-532.

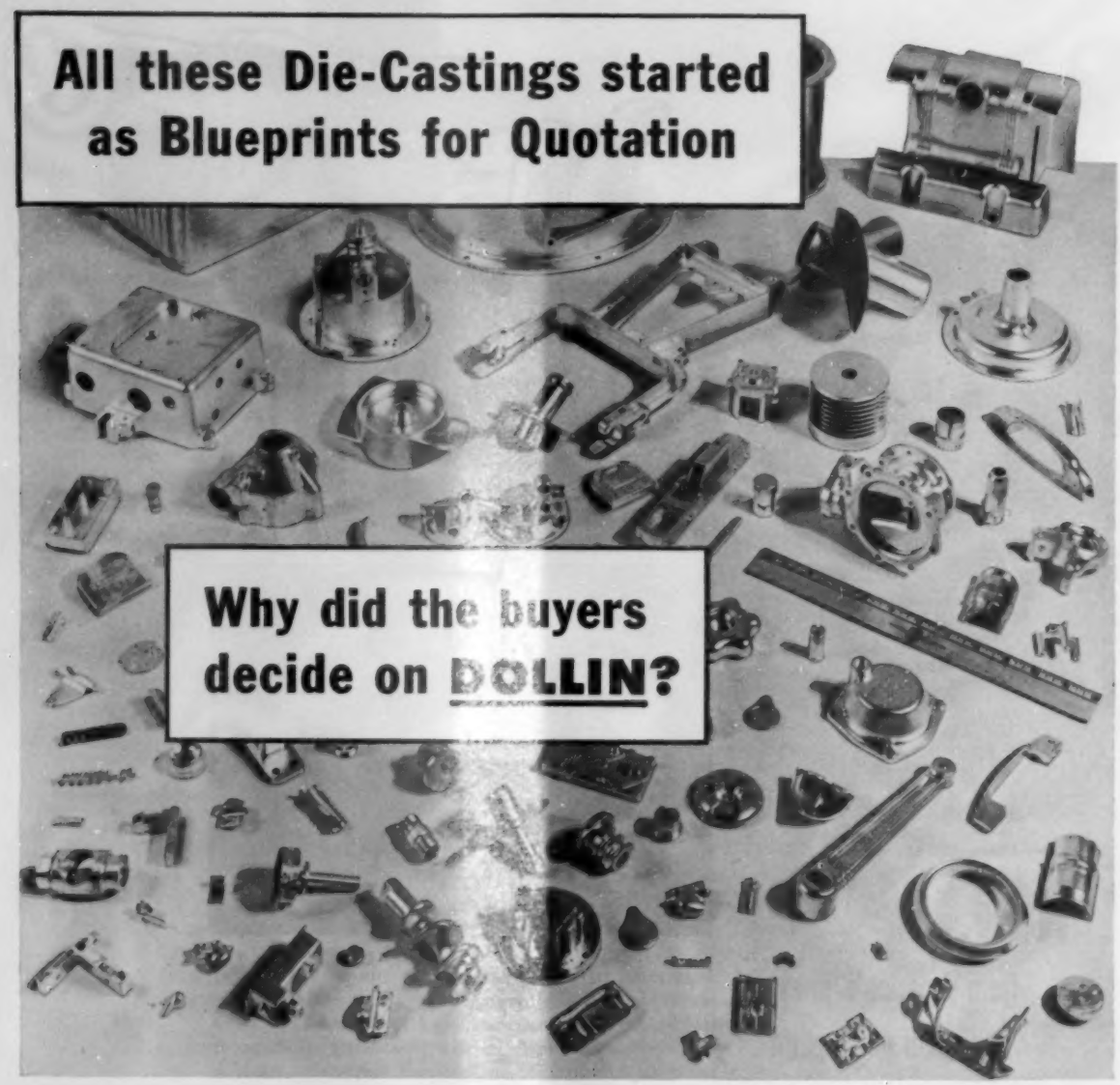
METALLURGICAL PRODUCTS DIVISION

Thompson Products, Inc.

DEPARTMENT MX25 • CLEVELAND 17, OHIO

For more information circle No. 63 on the Reader Service Card

All these Die-Castings started as Blueprints for Quotation



Why did the buyers decide on DOLLIN?

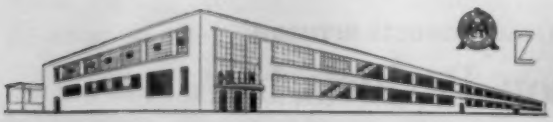
HERE'S WHY: In most cases, because Dollin could produce the highest quality die-castings at the lowest cost. In many cases, because Dollin engineers found practical answers to "impossible" designs. Still other cases, because of faster, more dependable delivery.

Find out for yourself how Dollin's unmatched experience — facilities — special equipment — and craftsmen put a "plus" in the part and a "minus" in the price.

LARGE CASTINGS — Aluminum castings made on large cold chamber type, high pressure machines. Large zinc castings made on large plunger type machines.

SMALL ZINC CASTINGS — 1000 per lb. to 3 per lb. — made on fully-automatic machines. More design latitude than other high-speed methods — attractive tool costs and piece prices.

Submit your next die casting specs or samples to Dollin for engineering advice or quotation.



DOLLIN CORPORATION, 614 So. 21st Street, Irvington 11, N. J.

Sales Offices: Boston • Buffalo • Canton • Charlotte • Chicago • Detroit
Louisville • Philadelphia • Pittsburgh • St. Louis • St. Paul

DOLLIN Zinc and Aluminum DIE-CASTINGS

For more information circle No. 18 on the Reader Service Card

GA&F

Carbonyl Iron Powders

These are spherical iron powders—as shown in the surrounding photomicrograph. Diameters run from 3 to 20 microns; in some types the iron content is as high as 99.6% to 99.9% . . . New types have recently been developed; there are today a total of 10—which may be classified as shown in this table.

FIRMNESS / PARTICLE SIZE RANGE	SOFT (EASILY COMPRESSIBLE TO HIGH DENSITIES)		HARD (PRESERVE SPHERICAL SHAPE UNDER PRESSURE)	
	"NORMAL"	SPECIAL FOR HIGH Q	"NORMAL"	SPECIAL FOR HIGH Q
COARSE	L	GQ-4	E	J
MEDIUM	HP	GS-6	TH	–
FINE	C	–	SF	W

*C HAS MEDIUM PARTICLE SIZE RANGE, BUT IS HARDER THAN HP.

Let us send you a 32-page book giving characteristics and applications . . . We invite you to call upon our research facilities and Technical Service Department for assistance in developing new applications or new products involving the use of any of these powders. We also invite inquiries for powders whose performance characteristics are different from those exhibited by any of our existing types . . . Kindly address Department 28.

From Research to Reality . . .

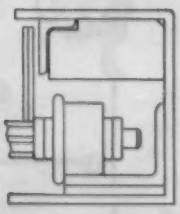
ANTARA ANTARA CHEMICALS

A SALES DIVISION OF GENERAL ANILINE & FILM CORPORATION

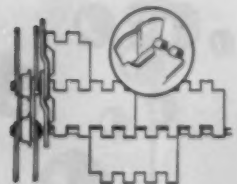
435 HUDSON STREET • NEW YORK 14, N. Y.

For more information circle No. 7 on the Reader Service Card

May-Fran hinged-steel conveyor belts



Construction details of "skirt" which prevents entry of foreign matter and protects side chains.



Outside links incorporate interlocking wings . . . remain positively engaged at all times.

For more efficient, more economical production in your plant . . . mechanize the handling of die castings. MAY-FRAN Hinged-Steel Belting keeps castings on the move . . . continually . . . automatically. Saves handling equipment, saves aisle space, saves manpower.

MAY-FRAN Hinged Steel Conveyor Belting withstands hot, heavy or abrasive parts . . . is built for long life and maintenance-free operation. Precision formed, heavy-gauge hinged-steel links are connected in horizontal rows by means of high-carbon steel rods. Side chains are an integral part of the belt . . . interlocking wings remain positively engaged, even when traveling over sprockets.

MAY-FRAN Hinged-Steel Belting can be furnished in widths from 6 inches to 6 feet . . . in any length . . . in any carrying capacity . . . with solid or perforated links in 2½ to 12-inch lengths.

For complete information, write today for Bulletin MF-530.

DESIGNERS AND BUILDERS OF COMPLETE HANDLING SYSTEMS

2160-MF

MAY-FRAN ENGINEERING, INCORPORATED

1686 Clarkstone Road • Cleveland 12, Ohio

For more information circle No. 39 on the Reader Service Card

New H-P-M Die Casting Machine offers more than just New Machine Design

The new H-P-M die casting machines are being hailed as the most important advancement in die casting in fifteen years, and rightly so . . . more than forty new and improved features! These features result in minimum mold flash . . . faster die set-up . . . greater versatility in die usage and casting design . . . reduced maintenance . . . maximum safety and performance. The new self-contained Link-Wedge mold clamp is the best. There's plenty of "beef" in these new models. They are available in a complete range of sizes . . . cold chamber or gooseneck types.

Write for Bulletin 5400 which describes these new units in detail.

HPM

THE HYDRAULIC PRESS MFG. COMPANY
1094 Marion Rd., Mount Gilead, Ohio, U. S. A.

For more information circle No. 29 on the Reader Service Card

Find Out Why You Get

Freedom from . . .

1 Porosity
2 High Cost Material
3 Expensive Machining
4 Metallurgical Variation

with

PERMANENT MOLD Gray Iron Castings

Write NOW for Our Illustrated Brochure

Permanent Mold Gray Iron Castings by DOSTAL offer many advantages. Their structure is uniform and surface scale is eliminated. These 2 factors permit higher speed machining with faster feeds. The dimensional accuracy and uniformity of DOSTAL Permanent Mold Castings reduces machining operations to a minimum. Permanent molded castings are uniform in hardness and their structure is dense and porous-free.

Cut Your Products Costs

Write Now!

DOSTAL

FOUNDRY and MACHINE COMPANY
2504 Williams Drive
Box 180 Pontiac, Mich.

circle No. 17 on the Reader Service Card

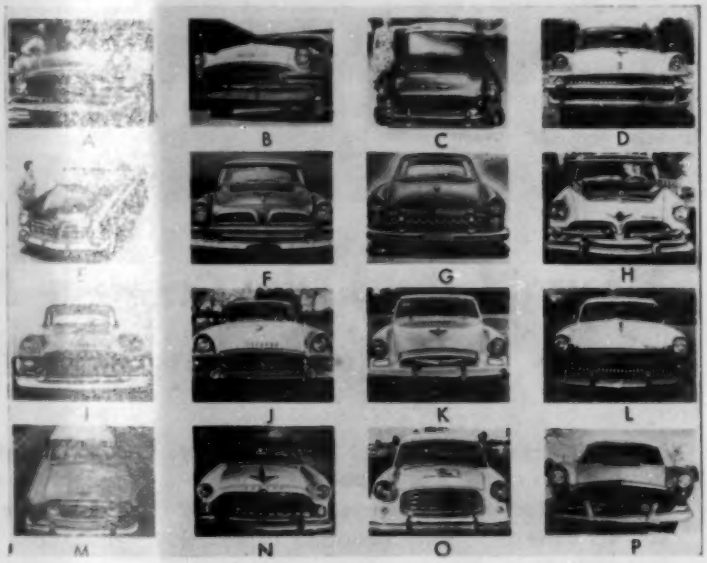
CASTING ABOUT

BOLD FRONT on today's automobiles comes from the large expanses of brightly chromium plated die castings being used in record numbers this year. On 1955 automobiles, more than eight times the weight of zinc die castings are used than were used on the front ends of 1954 cars.

Complete die cast grilles are seen on 16 different models, and another half dozen have major die cast elements in the front end, such as grille frames, lamp shrouds and bezels.

Many of the high style designs that add sparkle to this year's models could not be produced economically by any other method. Some of the outstanding individual uses of die cast front castings include: the complete grille, hood ornaments, header bars, lettering and other parts on the Buick, totaling 22 pounds; the dual section grille on the new Imperial weighing almost 25 pounds.

Some of the new "faces" in the auto world are arranged below, with a tabulation of the pounds of zinc die castings used in the front ends of 20 different models.



Car Model	Front End Die Casting Weight (pounds)
General Motors Corp.	
Cadillac	5.39
(A) Buick (Special & Century)	28.55
(B) Buick (Roadmaster & Super)	29.00
Oldsmobile	7.62
(C) Chevrolet	13.00
Chrysler Corp.*	
Plymouth	6.00
(H) Dodge	14.00
(G) DeSoto	22.00
(F) Chrysler	28.00
(E) Imperial	31.00
Ford Motor Company	
(D) Mercury	8.92
Lincoln	8.94
Ford	3.50
Studebaker-Packard Corp.	
(K) Studebaker	31.65
(J) Packard	39.93
(I) Clipper (Packard)	31.12
American Motors Corp.	
(O) Rambler	12.75
(M) Nash (Ambassador & Statesman)	22.85
(N) Hudson (Hornet & Wasp)	20.26
Willys Motors Inc.	
(P) Kaiser	23.25
(L) Willys	21.70

* Estimated

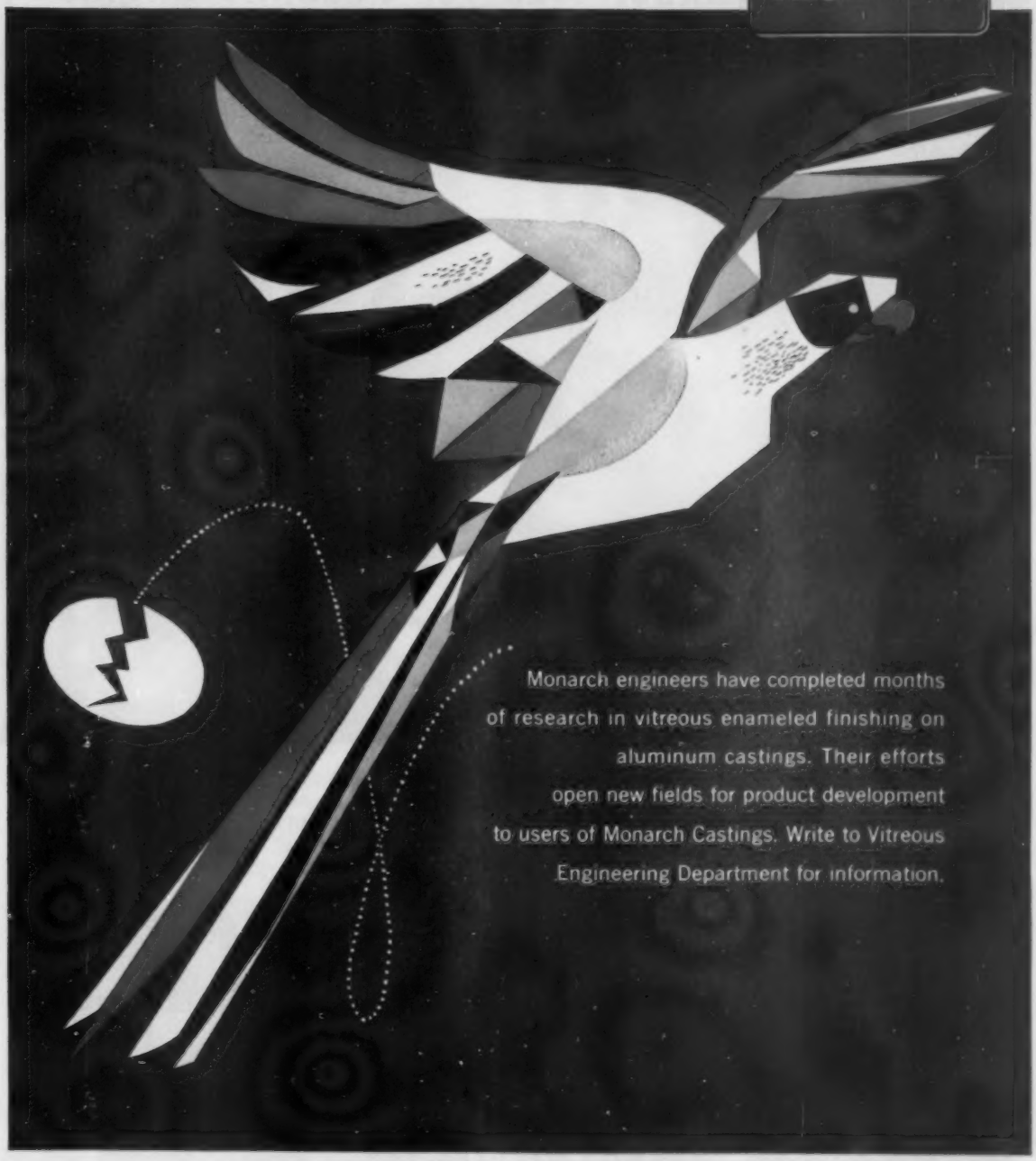
Continued on page 32

Visualize your products

using vitreous enameled aluminum castings

Picture the added sales appeal...with radiant color...surface protection ...design potential...plus the basic advantages of aluminum castings.

MONARCH ALUMINUM


Monarch engineers have completed months of research in vitreous enameled finishing on aluminum castings. Their efforts open new fields for product development to users of Monarch Castings. Write to Vitreous Engineering Department for information.

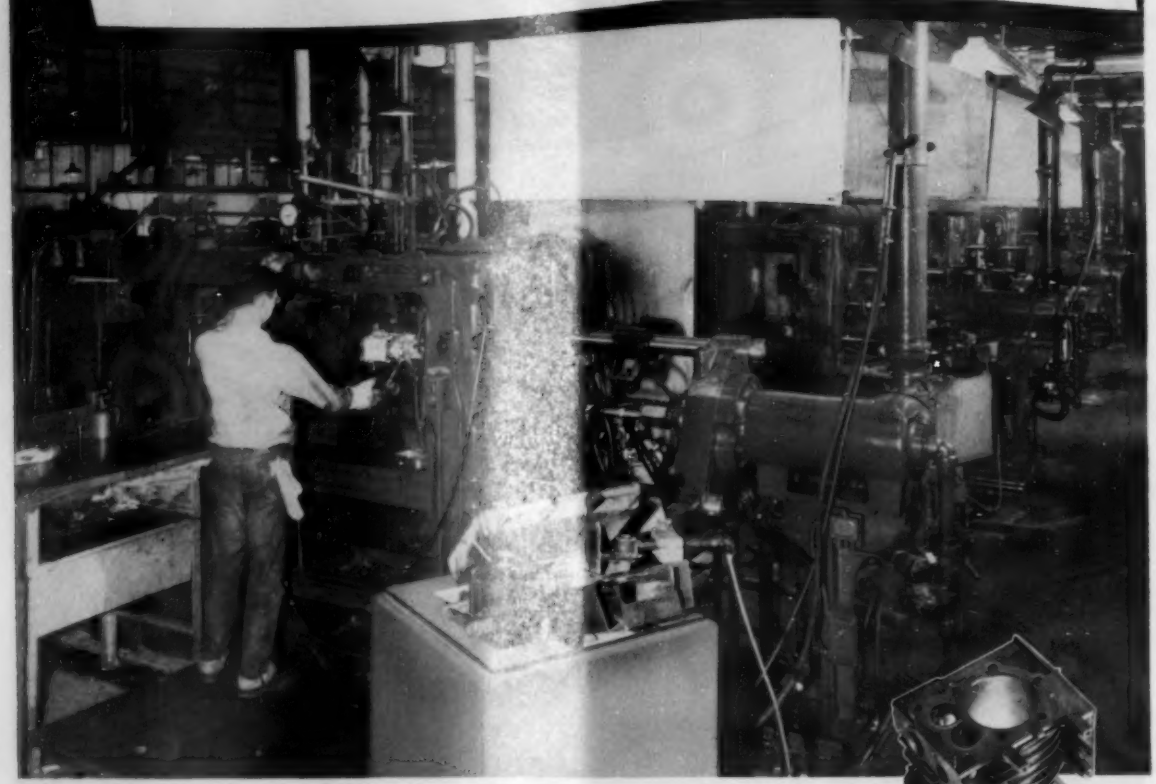
MONARCH ALUMINUM MFG. COMPANY — 9215 DETROIT AVENUE — CLEVELAND 2, OHIO

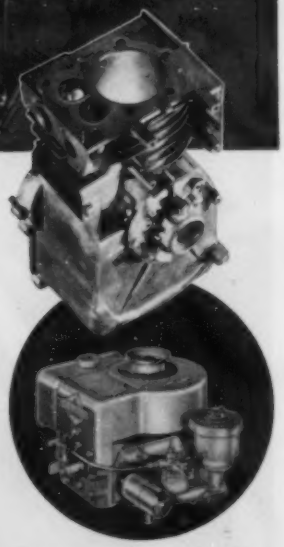
MANUFACTURERS OF: *Aluminum Permanent Mold Castings • Zinc Die Castings • Aluminum Die Castings Exclusive Velvaglaze Finishing • Vitreous Enamel Finishing.*

For more information circle No. 42 on the Reader Service Card

SUPER DENSE DIE CASTING

Forms Cylinder Wall for Gasoline Engine





The die cast aluminum cylinder block used by Briggs & Stratton on their famous 4 cycle, gasoline engines is a credit to the technical skill of our customer and the ability of the die casting machines on which the whole concept was based.

This die casting, produced on a battery of Lester HP-3-1/2X-SF die casting machines, is so dense that the aluminum itself is used as the cylinder wall against which the piston travels. No sleeve or liner of any kind is used—the only thing required is a simple honing operation.

If you buy, sell or use die castings of any size or for any use, you can get comparable quality—with Lester equipment.

LESTER DIE CASTING MACHINES

REPRESENTATIVES

New York	Steven F. Krould	Seattle	Perine Machinery & Supply Co., Inc.
Detroit	M. R. Tenenbaum	Cincinnati	Index Machinery Corp.
Chicago	J. J. Schmidt	Los Angeles	Seaboard Machinery Co.
Cleveland	Don Williams	San Francisco	J. Fraser Roe
Coral Gables	Morton Machinery Sales	St. Louis, Milwaukee	A. B. Geers

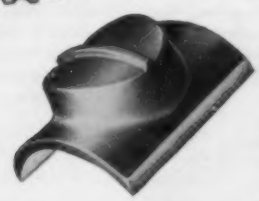
FOREIGN

Toronto, Canada	Modern Tool Works, Ltd.
Sydney, Australia	Scott & Holladay, Ltd.
Japan	Okura & Co., New York, Inc.
Stockholm, Sweden	Aktiebolaget Servus
Basle, Switzerland	Hermann Walti

For more information circle No. 33 on the Reader Service Card

The striking difference in color shows comparative resistance to oxidation, proves superiority of RESISTOX Metal Powder (left) when exposed same length of time as ordinary powder.

Resistox Process gives Glidden Metal Powders more stability through greater resistance to oxidation!



Glidden Resistox Metal Powders offer you distinct storage and production advantages over ordinary metal powders because they resist oxidation from 5 to 10 times longer!

This exclusive Resistox Process permits storage over long periods of time without fear of oxidation, thus eliminating production and product-quality problems.

Glidden Resistox Metal Powders meet every requirement for uniformity, purity, consistency, strength. There is less material waste and die wear. They permit faster production of precision parts with greatly improved finish, appearance and performance characteristics.

Let us supply you with more complete information on these Glidden products: Resistox Copper and Lead Powders, Cuprous Oxide, Cupric Oxide and Cubond (Copper Brazing Paste). There's no obligation.

THE GLIDDEN COMPANY

CHEMICALS • PIGMENTS • METALS DIVISION

Baltimore, Md. • Collinsville, Ill.
Hammond, Ind. • Scranton, Pa.

QUALITY Glidden PRODUCTS

For more information circle No. 22 on the Reader Service Card

FOR PRECISION
DIE-CASTING . . .
THE IMPROVED

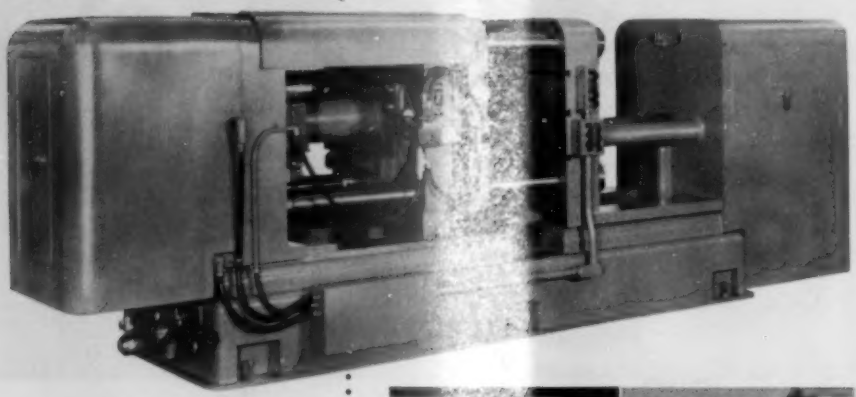
LEWIS 650-B

GIVES YOU FASTER
PRODUCTION . . .
MINIMUM SCRAP . . .
GREATER PROFIT

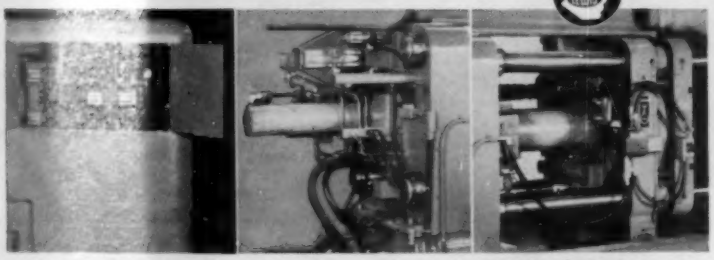
New and improved controls . . . a re-designed injection system . . . the exclusive "HYDRA-LOCK" clamp . . . and other outstanding features make this LEWIS die-forge casting machine tops in its trade.

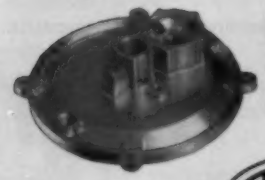
Versatile Model 650-B produces accurate pressure-tight light-metal castings with minimum scrap. All operations, except actual pouring, are either automatic or pushbutton controlled. Maximum safety is assured by the 650-ton clamping pressure and positive locking action of the "HYDRA-LOCK" clamp.

With eight years of research and pilot tests behind it, the LEWIS 650-B has been further refined . . . through "perfectionist" engineering and actual production operations . . . until it is the most advanced design available to the die-casting industry today.



hydra-lock BY LEWIS





Variable two-stage injection system develops pressures up to 100,000 pounds to assure dense flawless castings. Access doors in detachable hood permit rapid adjustment.

All valves and cylinders for moving platen, clamp mechanism and sliding-block locking device are mounted in one location for fast, easy adjustment and maintenance.

"HYDRA-LOCK", a new clamp principle exclusive in LEWIS machines, utilizes a large-diameter short-stroke hydraulic cylinder to develop final closing and locking pressures up to 650 tons.

Write today for Bulletin 103 for complete details.

LEWIS

THE LEWIS WELDING & ENGINEERING CORPORATION
63 Interstate Street • Bedford, Ohio

6130-LW

For more information circle No. 34 on the Reader Service Card

NAMES IN THE NEWS

Major Ralph J. Kotfila has joined the sales department of *Rem-Cru Titanium, Inc.*

J. Joseph Kelly has been appointed sales manager of *Reed-Prentice Corp.*

R. W. Rosenquest has been appointed manager of sales for *Stella Products Corp.*

Lawrence A. Franks has been appointed purchasing agent and **Lebbeus S. Case** production planning manager for *Reed-Prentice Corp.*

William W. Lamb has been appointed sales manager of *Precision Metalsmiths, Inc.*

James R. Crain has been appointed sales representative in southern Illinois and St. Louis for the foundry line of *Frederic B. Stevens, Inc.*

Maurice K. Heartfield has been elected chairman of the board and **Maurice K. Heartfield, Jr.** has been appointed vice president, sales, for *Foundry Rubber, Inc.*

Clarence B. Sampair has been elected to the board of *Minnesota Mining & Mfg. Co.*

Douglas E. Scott has been promoted to sales manager for the aluminum foundry, and **E. C. Turner,** sales manager for ductile iron and tire molds by *Morris Bean & Co.*

Dr. James T. Eaton has been elected vice president, production, of *E. F. Houghton & Co.*

Robert H. Kampschulte has been appointed general sales manager, chemical div., of the *Celanese Corp. of America.*

Personnel changes announced by *Vanadium Corp. of America* are: **Howard C. Parkman** assistant vice president, operations; **R. T. Bailey,** assistant vice president, production; **C. A. J. Schulte,** plant manager at Niagara Falls; **C. W. Mauk,** superintendent of furnace operations at Niagara Falls.

Harold M. Smith is the new representative in Northern New Jersey and **Otto Schmidt** is representative in northern Illinois for the *Nobur Mfg. Co.*

Continued on page 31

POWDER METALLURGY can duplicate this part for

61% LESS

MACHINED PART — 18¢
POWDERMET® PART — 7¢

Don't cut parts—*Cut Costs!*

—with YALE Powdered Metal Parts

When it comes to keeping production costs down, American industry turns more and more to powder metallurgy. For here are tough, accurate parts completely ready for assembly...that not only do the job more cheaply, but often *better!*

With identical machined parts, most of the cost goes into the expensive machining operation. The price of *one* machined part will buy up to *six* of the same parts in powdered metal!

Close tolerances, excellent wearability, and controlled porosity are established Powdermet® virtues. Special properties—such as self-lubrication, or unusual electrical characteristics—can also be achieved. Alloys are available exceeding the tensile strength of mild steel.

The answer to your production problems may well be Powdermet® parts...and Yale & Towne. For Yale & Towne has the experience and know-how to serve you best in this rapidly-developing new field.

A qualified Yale & Towne engineer is available to discuss the advantages and limitations of powdered metal parts—*right in your own plant!* He will show you how powder metallurgy may cut costs in *your* production operations. There is no obligation for this engineering counsel.

YALE & TOWNE

THE YALE & TOWNE MANUFACTURING CO
Powdered Metal Products Division
9335 BELMONT AVE. • FRANKLIN PARK, ILL.

TYPICAL PM PARTS

Filters	Gears
Bearings	Cams
Switch Parts	Keys
Wheels	Valves
Sprockets	Ratchets
Pawls	*And many more*

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The Yale & Towne Manufacturing Company
Powdered Metal Products Division
9335 West Belmont Avenue
Franklin Park, Illinois

☐ Send Booklet ☐ Send information on PM parts for attached specifications or drawings.
☐ Have a Yale & Towne Powdered Metal engineer call on me.

Name.....Title.....
Company.....
Address.....
City.....Zone.....State.....

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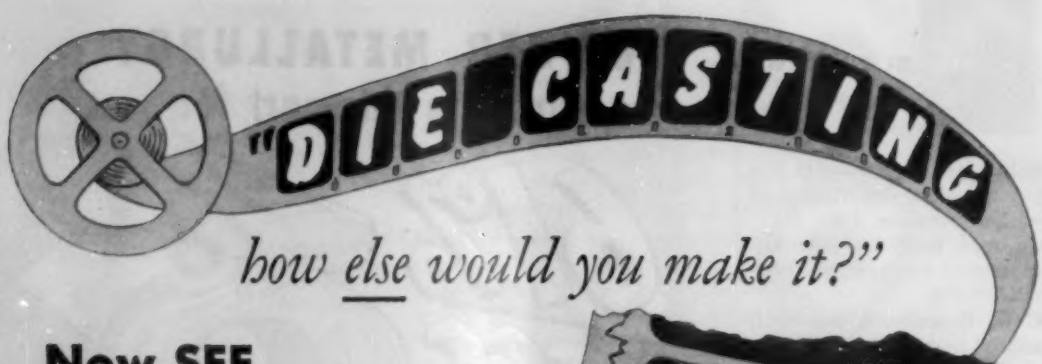


Now SEE and HEAR

what Die Casting can do for you!

Every design and production engineer should see the new 16mm color and sound motion picture, "DIE CASTING – How else would you make it?". This brand-new picture not only establishes the relationship of die casting to other high-speed production methods, but it fairly presents the place of zinc among the die casting metals. Prints of the film, which runs 35 minutes, are available now for use by industrial organizations, technical societies, engineering colleges and government agencies. They can be borrowed free of charge from the producer of the picture, the American Zinc Institute, Inc., 60 East 42 St., New York 17, N.Y. *When writing, try to give several alternate dates for the showing.*

Once bookings for the film are accepted by the American Zinc Institute, arrangements can frequently be made through the cooperation of the American Die Casting Institute, a national association of jobbing die casters, to provide technical commentators and exhibits for film showings. A 28-page booklet entitled, "Die Casting – Molten Metal to Finished Part... Direct," which contains supplementary technical information, has also been prepared by the American Zinc Institute and will be made available for distribution among the audience following the film presentation.

The picture should be of interest not only to potential users of die castings, but also to manufacturers who are now using die castings in the assembly of their products. They will find the film helpful towards re-evaluating both the die casting process and the metal zinc in the light of the latest developments in this rapidly growing industry.

↑ *top:* Automotive defroster duct zinc die castings being removed from the dies in a die casting machine. These die castings are made at the rate of 750 sets an hour.

bottom: A 60-in. long, 22-lb. zinc die cast automotive radiator grille being removed from the die casting machine die prior to buffing and plating operations.
(The above photos are part of case history sequences taken from the film.)

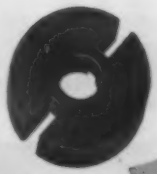
READ "Bunker Hill Zinc and Die Casting"... the story of DIE CASTING as a high-speed, low-cost production tool... ZINC and its advantages as a base metal for die castings... BUNKER HILL'S contribution to the phenomenal growth of the die casting industry. This new 8½ x 11", 24-page publication is yours for the asking. Write for copy on your company letterhead please.

EASTERN SALES AGENTS **ST. JOSEPH LEAD COMPANY** 250 PARK AVENUE, NEW YORK 17

BUNKER HILL 99.99+% ZINC

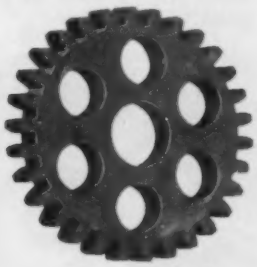
SALES OFFICE FOR PACIFIC COAST **NORTHWEST LEAD COMPANY** SEATTLE, WASHINGTON

A valve disc sleeve used in the air release mechanism of a Neptune Red Seal petroleum meter was originally made of brass rod stock, then of die-cast zinc (which proved unsatisfactory) and now of powdered brass. Tolerances are ±.001" on two diameters. The part costs no more than the unsatisfactory die casting and approximately ⅓ that of the machined part.



This oil pump rotor is used in several IBM machines. Saving in cost as compared with machined parts, says IBM, is 84%! Total tolerances of .001" and .002" are required. Powder metal processing eliminates all machining operations, which previously required 20 hours per 100 pieces.

Making this intermediate wringer-drive gear of iron and copper powder saves its user, the Whirlpool Corporation, St. Joseph, Michigan, up to $20,000 per year. The part was formerly made from a ⅜" blank which was pierced, flattened, machined for teeth; wire brushed for burr. Tolerances on the powder metal part are identical with those obtained by machining.



The Stokes 300-ton Model 713 hydraulic powder metal press, a recent addition to the complete line of 16 Stokes fully automatic powder metal presses of 1½ to 500 tons capacity. Powder metal presses of the modern Stokes' line embody THIRTY YEARS of powder metal press research and engineering.

The parts illustrated on this page are made by the Presmet Corporation, Worcester, Mass., custom maker of high-precision powder metal parts... like most producers of powder metal parts, a user of Stokes powder metal presses.

Powder Metal Processing

Saves $20,000 a Year on this Part

Parts which are difficult to machine... parts which are wasteful of solid metal... are made in powder metal at great savings.

Fully automatic compacting of a broad selection of metal powders, pure or mixed, gives wide flexibility in determining tolerances, tensile strength, and functional characteristics, many of them unattainable in solid metal.

Stokes has over thirty years' experience in making presses *specifically* for powder metal processing. Stokes engineers are recognized for their broad contributions to the growing success of powder metal processing... will gladly contribute their experience to manufacturers interested in powder metal processing as a means of cutting costs and improving products.

Three booklets available: "Powder Metallurgy Today"; catalog of Powder Metal Presses (#801); and "How to Save Money on Punches and Dies". Send for any or all.

F. J. Stokes Machine Company
Philadelphia 20, Pa.

STOKES

ENGINEERS:

Stokes is continually adding to its engineering and technical sales staffs in the high vacuum, industrial tabletting, powder metal and plastics molding fields. If you can qualify, there may be a position for you.

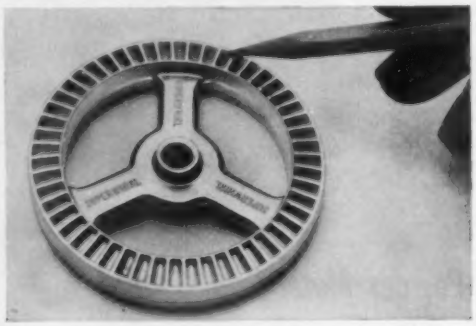
For more information circle No. 61 on the Reader Service Card

DIE CASTING REPORT

New, Low Cost Lightweight
Slide Projector
by AMERICAN OPTICAL
Features Streamlined Die-Cast Design

"The only way we could design these pleasing flow lines into our AO-300 projector," said American Optical Company engineers, "was to use die castings. And they helped us keep the projector's price low." Together with Precision's engineering department, AO designed the 3 aluminum die castings needed: housing, cover, and slide changer. Exact location of bosses and projections in every casting permits pre-assembly of optical and blower systems. These are then put together with *five* screws!

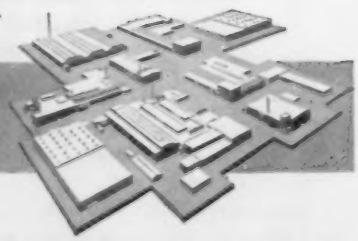
Sturdy Eggbeater
with die-cast frame and fly-wheel built for lifetime service and beauty



Problem facing Turner & Seymour was to get a smooth, long-lasting chrome finish for this handsome kitchen utensil. Castings had to be absolutely free of surface imperfections. Precision Castings Company engineers met this challenge and suggested redesigning the most critical part—the gear—so that gear teeth and outer rim could hold better finish. Production costs were reduced and the housewife gets lifetime service!

ARE YOU PLANNING A NEW PRODUCT OR COMPONENT PART?

Ask the Precision team of design and metallurgical engineers how modern die-casting methods in aluminum, magnesium or zinc can solve complicated design problems, reduce weight, help eliminate machining, reduce assembly and shipping cost . . . and give you unlimited production of identical parts. Write for the *Precision story* — "Die Castings . . . Unlimited." Address your request to Precision Castings Co., Inc., 207 Walnut Street, Fayetteville, N. Y.



PRECISION CASTINGS CO., INC.
World's largest independent producer: aluminum, magnesium and zinc die castings

FAYETTEVILLE, N. Y. — CLEVELAND, OHIO — KALAMAZOO, MICH.
SYRACUSE, N. Y. — CHICAGO, ILL. — CORTLAND, N. Y.

For more information circle No. 53 on the Reader Service Card

NAMES IN THE NEWS
continued from page 27

New appointments announced by the *F. J. Stokes Machine Co.* are: **J. Gordon Seiter,** manager of the new High Vacuum Div.; **G. Jewett Crites,** manager of the Vacuum Processing Div.; **John F. Maguire, Jr.,** manager of drum dryer and flaker sales; and **Kendrick C. Taylor** sales engineer of vacuum furnaces.

William A. Damerel has been appointed vice president and **Dr. Fred Schulman** as assistant director of research of the *Mercast Corp.*

Bernard A. McDermott has joined the design firm of *Smith and Scherr* as a partner.

Robert A. Putney has been appointed assistant manager of the metal department, *National Lead Co.*

J. P. Murphy has been appointed to sales development and **R. E. TenHoor** has been appointed supervisor of the newly created Technical Service and Development section of *Dow Chemical Co.* The company also announced the addition of a magnesium sales group in the Philadelphia office to be headed by **J. B. Reid.**

R. W. Stephens has joined the staff of *United Chromium Ltd.* as sales and service engineer in Canada.

A. W. Orr and **J. W. Roper** were appointed buyers of metal scrap for *National Lead Co.*

William J. Murray has been transferred to the Philadelphia office and **William M. Dempster** has moved to the Syracuse office of *Surface Combustion Co.*

A. F. Anzlovar has been appointed vice pres. of the *Mercast Mfg. Corp.*

The Carl H. Schmidt Co. has been appointed sales represenatives in the Detroit area for *Arwood Precision Casting Corp.*

Paul M. Barnes has been named export sales supervisor of *Acheson Colloids Co.*

For structural and other parts produced by POWDER METALLURGY

VASCO
Prealloyed
STEEL POWDERS

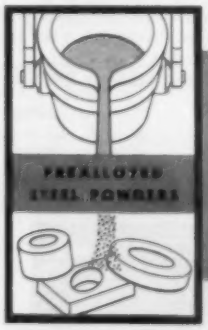
Featuring Powders for Parts Requiring:

- √ HIGH STRENGTH
- √ DUCTILITY
- √ HARDNESS
- √ WEAR RESISTANCE
- √ CORROSION RESISTANCE
- √ RESPONSE TO HEAT TREATMENT
- √ POROSITY OR FULL DENSITY

OR A COMBINATION OF THESE PROPERTIES

These powders are produced direct from the molten metal, each particle being of the chemical analysis of the full melt. The analysis, of course, can be varied to create emphasis on any of the above mentioned properties.

Typical compositions are A.I.S.I. 4650 for high strength, hardenable parts; and Stainless Types 302B and 316 for corrosion resistance. Such powders are available from stock. Special compositions are available to your requirements.



VANADIUM-ALLOYS
STEEL COMPANY
Latrobe, Pa.

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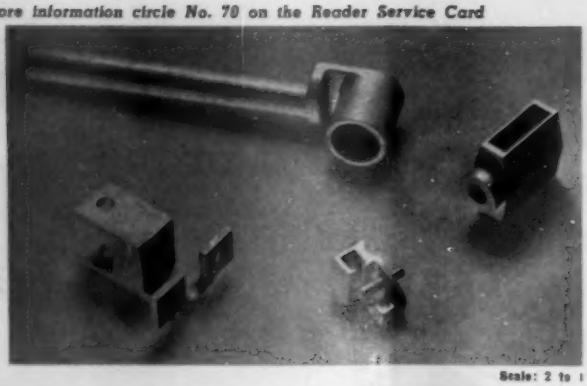
For more information circle No. 70 on the Reader Service Card

These parts were cast by Z&H MFG. CORP. by the "LOST WAX PROCESS" thereby eliminating costly machining operations



Scale: 2 to 1

MACHINED? or CAST?

Solve it with ***Precision Investment Castings.*** They're cast centrifugally, with all models and molds made by Z & H, specializing in non-ferrous metals; enabling us to give you sample delivery approximately 3 weeks from day we receive order.

Prompt quotations on blueprints. Send yours now.
Or write for full information.

Z&H

Z & H M[illegible] CORP.
31 Welcher Avenue [illegible]kskill, New York

Advance... always
a good name to remember when you need aluminum and zinc DIE CASTINGS

The results of ADVANCE zinc and aluminum die casting engineering is seen everywhere today in home kitchen appliances, office equipment, power tools, engines, electrical parts, etc., etc. For years large manufacturers, and small, have preferred ADVANCE experience and long technical background — ability to produce design economies and meet rigid production schedules. Yes . . . ADVANCE is a source for zinc and aluminum die castings you can depend on. Write for our folder "YOUR DOORWAY to Certified Zinc and Precision Aluminum Die Castings".

These symbols are your assurance of highest quality zinc and aluminum alloys under ASTM standards.

ADVANCE TOOL AND DIE CASTING COMPANY
34 years of service to industry
3760 NORTH HOLTON STREET • MILWAUKEE 12, WISCONSIN

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CASTING ABOUT
continued from page 22

CRACK-FREE CHROMIUM plating is being tried out directly on zinc die castings, according to United Chromium's house organ, The Unichrome Observer. Normal chromium plating lacks ductility and, like a thin layer of mud dried in the sun, develops a network of microscopic cracks due to internal stresses. Now, a crack-free deposit (labeled SRHS crack-free chromium plate) has been developed and gained important use on steel. One company is reported to be trying this plate directly on zinc die castings and then buffing.

WORLD'S LARGEST SANDPAPER maker is a machine as long as three city blocks recently put into operation by Minnesota Mining & Mfg. The 976-foot long plant is actually a single machine with a shell built around it.

MOLECULAR SIEVES to separate and purify mixtures of gases or liquids have been developed by Linde Air Products. They use the porous crystal structure of man-made zeolite crystals which adsorb molecules of gas or liquid selectively. Ability to adsorb water at temperatures up to 212 F, to select molecules within a given size range, and other properties are reported.

SIGNS OF THE TIMES are the 14,000 new aluminum alloy street signs and frames to be installed in the Borough of Manhattan. Shown here are representatives of American Smelting & Refining Company's Federated Metals Division, examining one of the new street signs made from their Tenzaloy alloy. The new

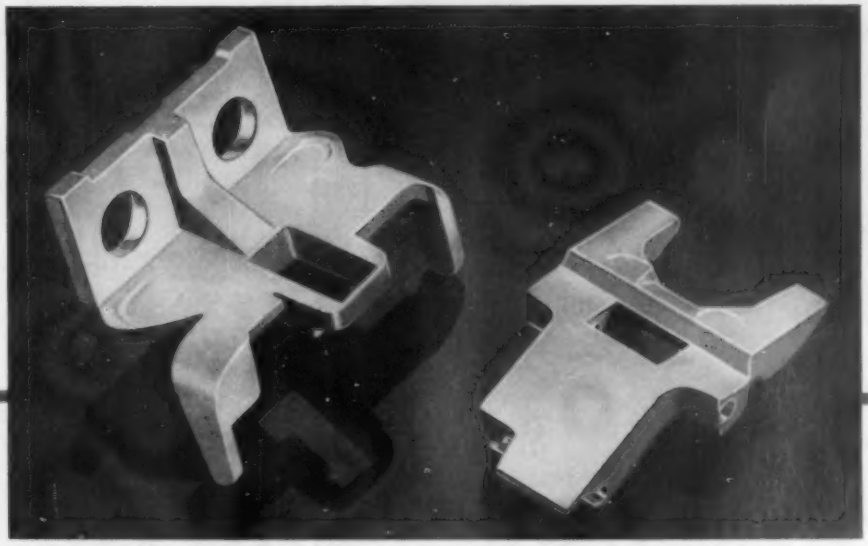
type of signs is expected to reduce maintenance, repair and replacement costs. Municipal Street Sign Co., Inc., who produce the signs, guarantee that the signs will still be rust-free and shiny in 15 years, despite the corrosive atmosphere containing salt air, industrial fumes, vehicle exhaust fumes and abrasive particles.

Continued on page 35

WW METAL

PREMIUM QUALITY ALUMINUM BRONZES

Castings, Forgings, Ingots*



Permanent mold casting of WW 175 Metal for use in circuit breaker

Ask for Technical Data Bulletin 15.100

The WW process of pre-alloying all Aluminum Bronze Alloys, together with WW's experience in heat treatment, assures true premium quality in all that the name implies. Grain structure is excellent and uniformity of product can be depended upon. The following are but a few of the standard WW Aluminum Bronze Alloys.

WW METAL GRADE	NOMINAL CHEMICAL COMPOSITION	TREATMENT	TENSILE STRENGTH psi	YIELD STRENGTH psi	ELONGATION % in 2"	HARDNESS BRINELL
WW-125	88 Cu, 9 Al, 3 Fe	Cast and Wrought	65,000	28,000	25	125
WW-175	85.2 Cu, 10.8 Al, 3.7 Fe, .30 Special Elements	Cast and Wrought	90,000	35,000	12	175
WW-230HT	10.5—11.5 Al, 4—5 Fe, 4—5 Ni, Bal. Cu	Cast and Heat Treated	105,000	60,000	10	230
WW-275	82 Cu, 13 Al, 4.5 Fe, .50 Special Elements	Centrifugal and Sand Castings	80,000	55,000	1.5	275
WW-375	14.5—15.5 Al, 4.5—5.5 Fe, Bal. Cu and Spl. Elements	Centrifugal and Sand Castings	80,000	60,000	—	375

* ***WW Metal Ingot is available to selected foundries on a licensee basis. Write for details.***

WW ALLOYS, INC.

Division of Fansteel Metallurgical Corporation

11644 CLOVERDALE AVENUE, DETROIT 4, MICHIGAN

Home of Premium Quality Alloy Castings and Forgings

Y551

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cut downtime; avoid damaged dies.

When you use Die Slick, you insure your operation against the many high costs of down-time. Die Slick prevents sticking, soldering, ejector pin wear, and die damage. On difficult jobs, it often makes the difference between failure and success. We are confident that a week's trial in your shop will show you how Die Slick pays off in more production and better quality. To be sure we send you the most effective grade of Die Slick, please specify the metal or alloy you're casting.

DIE SLICK®

used by die casters everywhere

G. W. SMITH & SONS, INC., 5400 KEMP ROAD, DAYTON 3, OHIO

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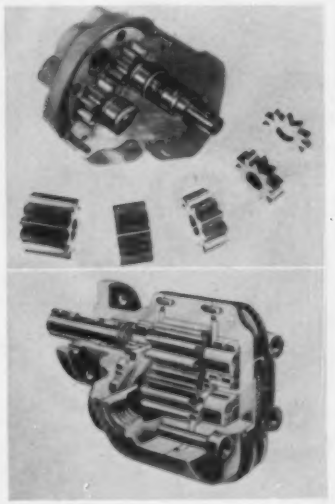
CASTING ABOUT
continued from page 32

THREE-WAY RESEARCH has resulted in the production by powder metallurgy of high strength steel gears with tensile strength above 100,000 psi, C-30 particle hardness, and greater wear-resistance than previously used solid alloy steel gears.

Using pre-alloyed 4650 steel powder produced by Vanadium-Alloys Steel Co., the gears were made for hydraulic gear pumps of Hydreco Division of New York Air Brake Co. Fabricator of the powdered steel gears was Keystone Carbon Company.



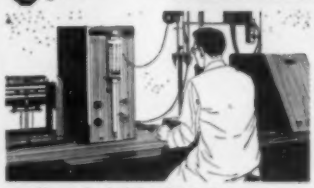
The three-way partnership in the development of these gears has resulted in pump gears that are not only less expensive than previous gears, but display superior performance characteristics.

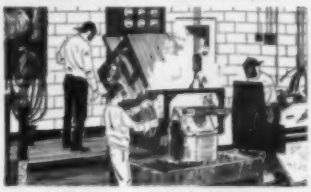
Keystone presently is producing the powdered alloy steel gears in 1½-inch pitch diameter with lengths from ¼ to 1½ inches. Field tests and accelerated life tests by Hydreco has convinced company engineers that these new powdered metal gears are equal, if not superior, to the cut gears originally used. Tests were made under varying conditions of temperature, pressure, speed, clearances and oil cleanliness to prove the superior resistance to end face wear and scoring of the new type gears.

Properties of the pre-alloyed powder make it possible to harden a thick section completely through to provide strong core and surface. Material responds to heat treating in the same manner as parts cut from bar stock having the same analysis.

Need pounds or tons of

Call on Cannon-Muskegon


Heats checked for chemical analysis.


High frequency induction furnaces.

Carried in stock are supplies of the 300 and 400 stainless steels as well as carbon alloys. "Specials" including electronic and aeronautical type alloys, tool steels, ferritic, austenitic and super stainless alloys of nickel- and cobalt-base. Available in shot, ingot, billet or cast bars.

Exactly predictable metallurgical control of finished casting is assured by MasterMet control of high-temp alloys, tool, stainless, and carbon steels

You specify the alloy — we'll tailor it to your needs, backed by a *certified* analysis! Name the quantity and the fast delivery will surprise you! Preparation can begin almost immediately after receipt of order. MasterMet "alloy tailoring" gives you all this:

MATCHED ALLOYS TO YOUR MELTING PROGRAM — Close control assures a constantly uniform melt. The results you get from a sample cast are the same as the final production run.

MASTERMET CERTIFIED ANALYSIS—Regularly furnished are notarized certificates insuring alloys that will cast to your exact production specifications.

PRODUCTION MELTS OR SAMPLE JOBS — A combination of test furnaces and larger multiple production furnaces assure completely flexible service at any time.

FAST ACTION ON YOUR ORDERS — No long delays for a mill run. Alloys delivered in drums, clearly marked with all specifications for fast selection and storage.

Write today for your copy of new MasterMet Alloy Bulletin for complete technical details.

Cannon Muskegon CORPORATION
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METALLURGICAL SPECIALISTS

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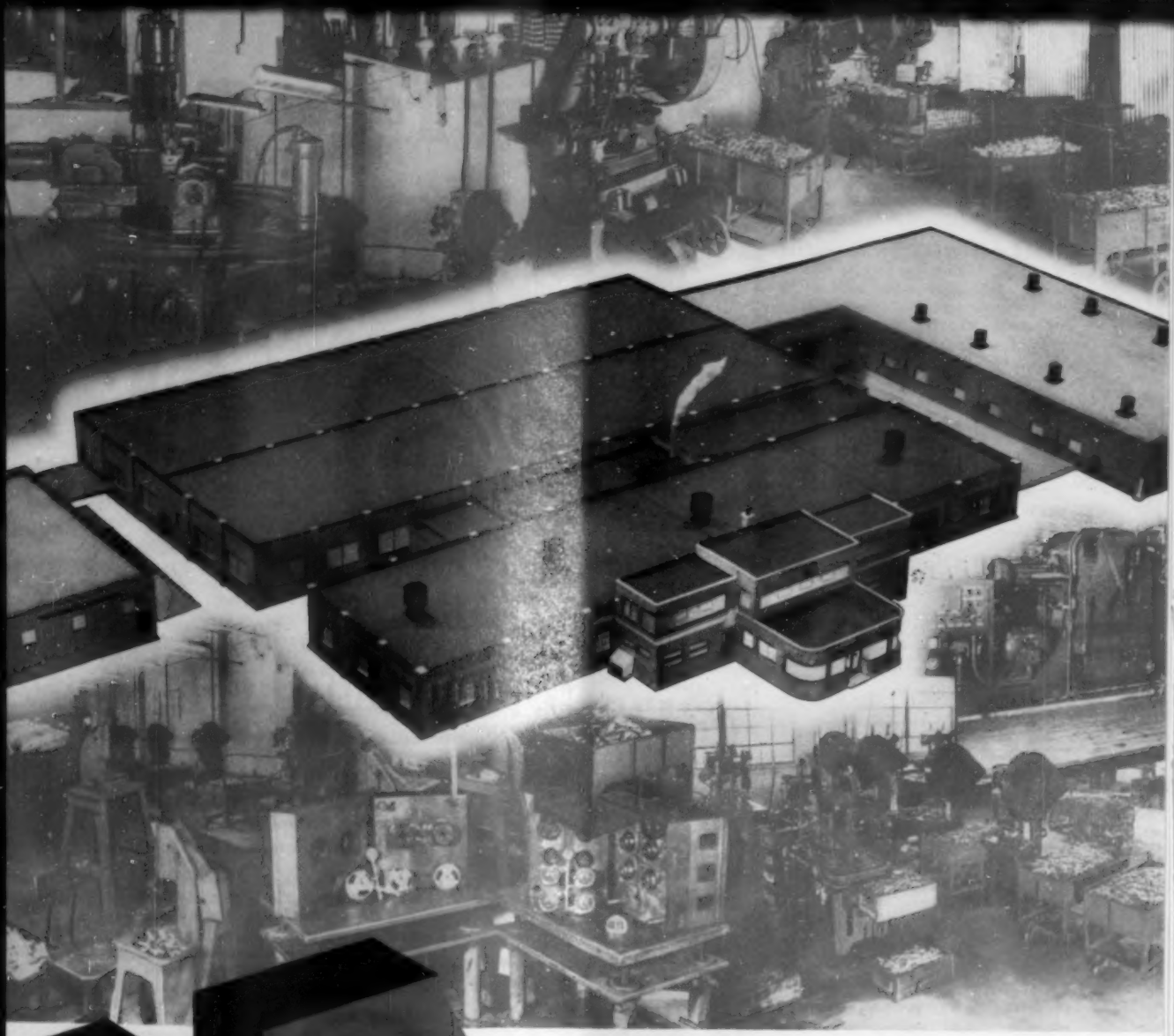

60,000 square feet of complete, modern die casting facilities

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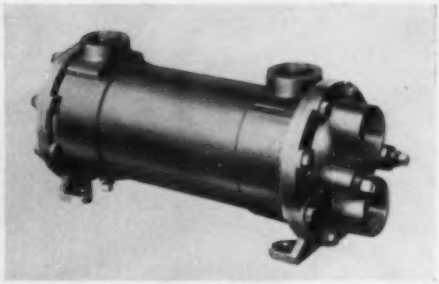
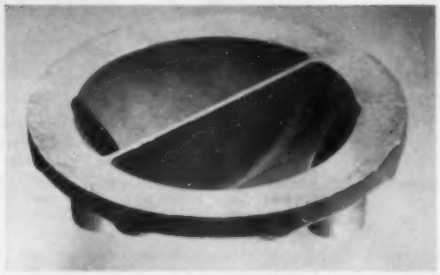
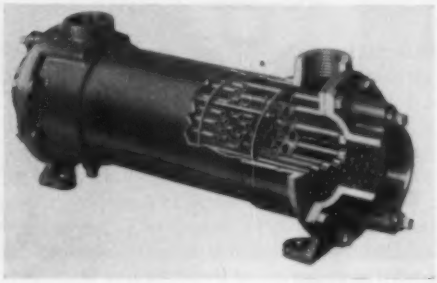
NEW ENGLAND DIE CASTING CO., 445 FRONT AVE. WEST HAVEN, CONN.



Standard model heat exchanger . . .



. . . uses shell molded bonnet



. . . for lower cost, superior quality

When Specials Become Standards

It's Time To Consider Precision Castings

WHEN acceptance of any product reaches the point where certain models can be considered "standards" and are sold in large enough quantities to be inventoried, then it is time to reconsider manufacturing methods.

During early stages of development, it may often be risky to invest in the higher priced tooling which precision metal forming methods often entail, even though piece costs are likely to be lower. The question arises: "Will the total number of pieces be great enough to effect savings over and above the high initial tool cost?"

Very often, when orders for several thousand units can be anticipated at regular intervals, it becomes good business to stock these units, ordering components in larger quantities and processing them in larger batches. At this point, metal components that have been machined from rough sand castings can be converted to shell mold castings which require less finish machining.

This has been the experience of Kewanee-Ross Corp., a Division of American Radiator & Standard Sanitary Corp., who have found that shell mold castings in red brass not only give excellent performance, but save money over sand castings for the bonnets of some of their smaller, "standard" heat exchangers.

Not many years ago, heat exchangers were generally custom-made for each installation, but more recently, they have become so widely accepted on such equipment as diesel engines, die casting machines and other industrial equipment that substantial volume of annual production within a certain size range can be predicted.

The Ross Type BCF Exchangers come within this range, and so it is not surprising that shell mold castings are being used for the bonnets on these units. They were previously sand cast.

Better Metallurgical Quality

As an example of the saving in machine time, the surface of the sand cast bonnet that is gasketed required the removal of about 1/16" of stock; now, only a light disc grinding is needed, requiring neither set-up nor special machine.

Two openings that were previously drilled and tapped now need only reaming and tapping; All-over finishing has been eliminated.

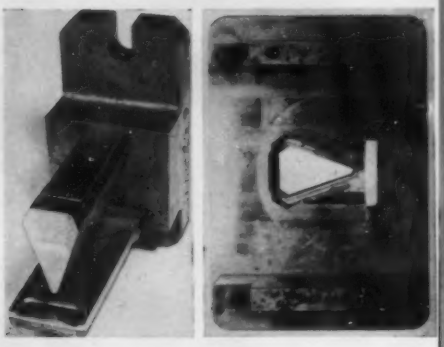
Weight-saving, while not a determining factor, is certainly desirable in industrial equipment, where most manufacturers are seeking lighter equipment. Here, shell mold casting delivers a casting with thinner, lighter wall sections without any sacrifice in strength or quality.

In fact, the metallurgical quality of a shell mold casting is superior due to the high permeability of the shell mold, which permits ready escape of gases, thus assuring an essentially non-porous casting.

Continued on page 70

Cast Tooling

Here's how it saves money on plastic molds



1. A COMPLETE SET of plastic molding tools. Both punch and die were made as investment castings in a castable grade of die steel. After mounting they are used either singly or in multiple in a pressure molding or injection molding press.

By **H. C. MARQUARDT,** Manufacturing Engineer
Cutler-Hammer, Inc., Milwaukee, Wis.

ONE use of the investment casting process that is either not known to, or little used by, design and tool engineers is in the manufacture of plastic molding dies. Work done by Cutler-Hammer, Inc., over the past several years, has shown that, under some conditions, impressive economies in die costs are possible.

At the outset, it should be understood that this type of work almost always is limited to short runs. The investment casting foundry must, therefore, be set up in a highly flexible manner to take maximum advantage of this potential market. The following description of Cutler-Hammer's technique is intended to demonstrate to the plastics tool engineer that savings in the cost of compression molding and injection molding dies are feasible.

Under the particular conditions existing in this plant, it has been found that, when three or more duplicate die sets are required, whether used consecutively or concurrently, the cost per set of tools is lower when they are made by investment casting rather than by machining from a block of steel. The saving is highly variable and, of course, is greater when higher numbers of tools are made. However, an average saving of from 40 to 70 percent per set of dies before they are mounted has been shown.

The tools are cast in one of the Stellites or in a castable grade of tool steel that will have, in the as-cast and heat-treated condition, the required mechanical properties for the intended usage. In designing the investment cast parts, some cleanup on contact surfaces must be allowed, generally 0.0015 per side is adequate. Decarburization during casting seldom exceeds this depth and, if it does, the carbon on the surface can be restored during heat treatment.

The actual manufacture of the investment cast die components differs in some respects from the usual foundry practice. The pieces are usually much larger than is normal practice so that only one part is cast per flask.

Polystyrene patterns are used exclusively and, since the amount of material per pattern is large and, as a rule, only a few plastic patterns are needed, injection molding is not practiced. Instead a form of pressure molding has been developed that is adequate for this work.

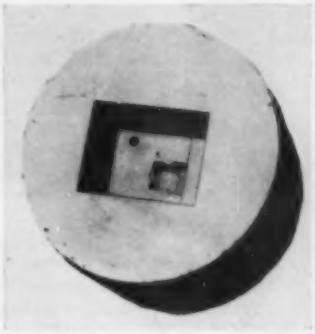
Again, because of the small number of patterns that are generally needed, steel pattern molds are not used. A steel master of the part to be cast is made, and from this, kirksite molds are prepared. The polystyrene patterns are then made in this kirksite mold.

Total shrinkage allowances using the methods developed are from 0.002 to 0.005 in. per in. Step-by-step procedure in making castings are:

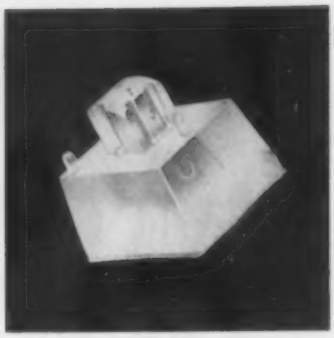
1. Mount the pattern adequately and coat with three pre-coats. The pre-coat is 320 mesh silica flour in a sodium silicate, hydrochloric acid, water vehicle.
2. Dust with fine sand.
3. Finish investment with backup material.
4. Heat to 500 F (the furnaces are generally held at 180 F minimum) to dry the investment and start the burnout. Heat slowly to 1700 F to complete the burnout and conversion of the investment material. Drop to casting temperature, generally about 1300 F.
5. Cast in centrifugal machine.

It is worthy of note that the size of the final casting can be controlled with some nicety by controlling the temperature of both the mold and the metal at the time of pouring.

2. A MASTER PATTERN is made of tool steel. This is an exact replica of the part to be cast with necessary allowances for shrinkages, metal clean-up, etc. Then . . .

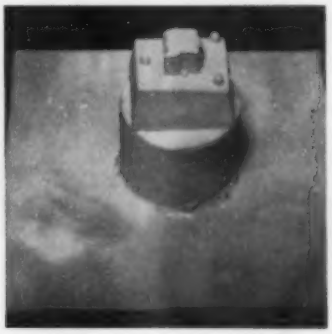


3. A KIRKSITE MOLD utilizing a pressure casting method specially developed for the work, is made from the master pattern. From this mold . . .



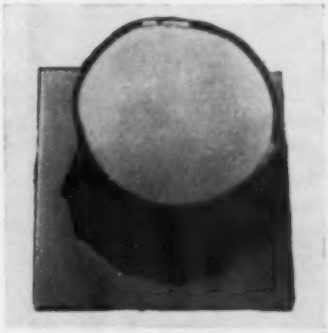
4. A POLYSTYRENE PATTERN is made. Pressure molding is used here since the amount of plastic to be molded is too great for the average injection molding machine. Next. . . .

5. THE PLASTIC PATTERN is mounted on a suitable base, generally a plastic block, and this assembly is cemented to a metal base plate. Following the mounting . . .



6. THREE SPRAY COATS of very finely divided silica are applied to the pattern. Spray coats are used in preference to dip coats to insure retention of the most minute details. Then . . .

7. THE COATED PATTERN is placed in a flask preparatory to pouring in the balance of the investment material. Contrary to usual practice, only one pattern per flask is used. Now . . .



8. The pattern is fully invested with one of the standard investment materials, and is ready for burn-out.

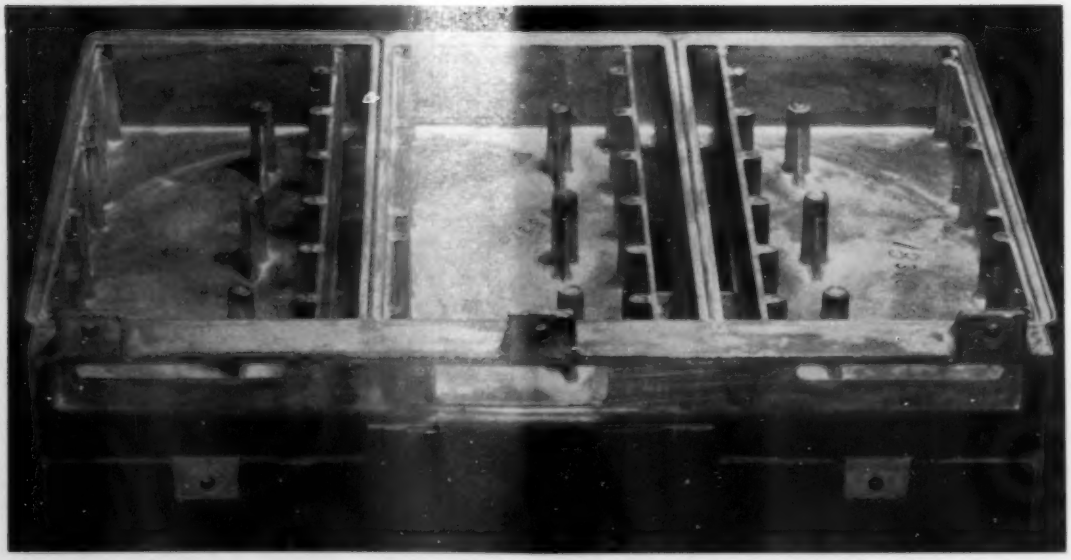
9. AFTER MELTING OUT the plastic pattern and preheating the mold, see text, the mold is placed in a centrifugal casting machine and the metal poured while the mold is rapidly spun. Finally . . .

10. THE FINISHED DIE PART is removed from the mold and is ready for final machining. All details have been faithfully reproduced and a maximum of 0.0015" per surface has to be removed.

IF your product should be quieter than it is, maybe you can use magnesium die castings to deaden undesirable sounds.

Sound-Proof Your Product

Booming market for electric organs pushed Wurlitzer's sales of units like this one up 400% in 1953, another 30% in 1954.



DAMPING as well as accurate mounting, is accomplished by a pair of these die cast magnesium reed housings. Mating halves provide six chambers for the free-blown brass reeds which generate an infinite variety of musical tones.

UNWANTED sounds are the bug-bear of many product designers, now that quiet operation has become an essential consideration in the design of such equipment as household appliances, office machines and industrial machines . . .

Manufacturers who have this problem might well take a page from the notebook of a producer of fine musical instruments, where the development of desired tones and the suppression of unwanted ones are fundamental.

The Rudolph Wurlitzer Company, builders of pianos, electric organs and coin-operated record players, had a particularly critical sound-damping problem when they designed their line of electric organs.

Tone generation is accomplished by the vibration of free-blown brass reeds mounted in six individual chambers, each containing one octave. Air flow into and out of each of these chambers is closely controlled.

The tongue of the reed serves, in effect, as the diaphragm portion of a miniature "microphone", generating a tone rich in harmonics. This individual tone, with all its unique qualities, is carried by the amplifying system of the organ, but care must be exercised to prevent the direct sound of the reeds from being heard. Thus, all tones must be transmitted electrically, none permitted uncontrolled passage through the walls of the organ.

To help in accomplishing this, company engineers sought a metal having good sound-damping characteristics for the reed chambers. They preferred a die castable alloy because 20 years of experience using die cast zinc and aluminum have proved the economy and dependability of die castings, very widely used in the company's record playing devices.

For the reed housings, magnesium die castings were chosen, not because of the metal's light weight, but to utilize its damping properties. The low mass and low modulus of elasticity of magnesium have the effect of diffusing and deadening sound vibrations.

The reed housing has been divided into right and left halves, each with three chambers. The halves are die cast in magnesium by Accurate Die Casting Company, who also produce a large number of zinc and aluminum die castings for Wurlitzer's record players.

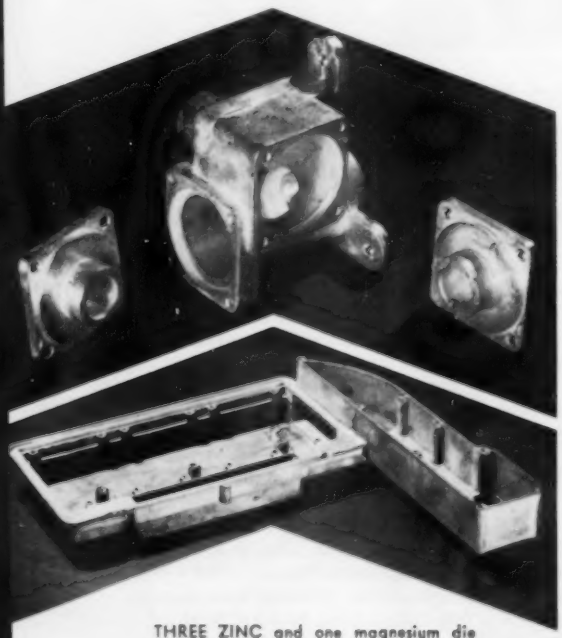
The assembled magnesium die castings make a rigid, strong and economical housing. The chambers are formed with rabbet around the edge for gasketing, bosses for attaching the cover, and bosses for mounting the panels of reeds.

Most holes for assembling occur in the cast bosses, but are drilled and tapped by Wurlitzer. Some small holes in a side core, several small, blind holes, and deep recesses for metal saving, are cored.

Machining this metal . . . sometimes avoided as too hazardous . . . has presented no problem to Wurlitzer's production department, and there have been no fires in the three years that the die cast magnesium parts have been in use. The production line handles magnesium as a matter of routine; good housekeeping practices, regular chip disposal and the presence of a convenient, portable fire extinguishing apparatus have been the methods used to prevent fires.

Multiple and single spindle drill presses with simple box-type fixtures are used for drilling and tapping. The trick of drilling magnesium, company engineers report, is to machine dry, use high speed drills with fast twist, and make sure tools are kept very sharp.

In some models of organs, an extra reed chamber is required. This is also produced as magnesium die casting and attached to the other two castings. Besides the three magnesium die castings, an assembly of three zinc die castings is also used in the electric organ. These are a gear box and two covers, a conventional and long-established application for zinc die castings.

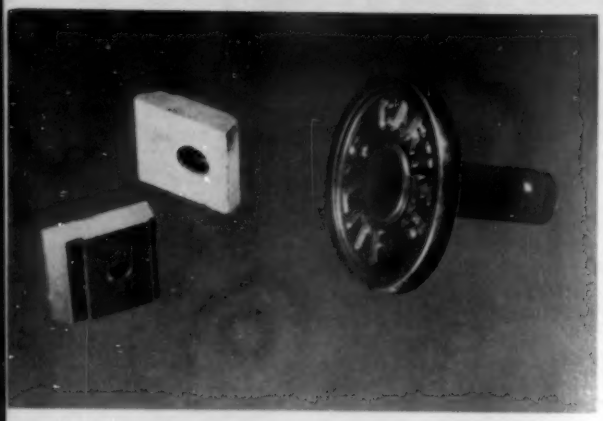


THREE ZINC and one magnesium die casting, above, are also used in these organs. The group of three pieces is a gear box and covers in zinc, while the lower picture is a third reed chamber, sometimes used.

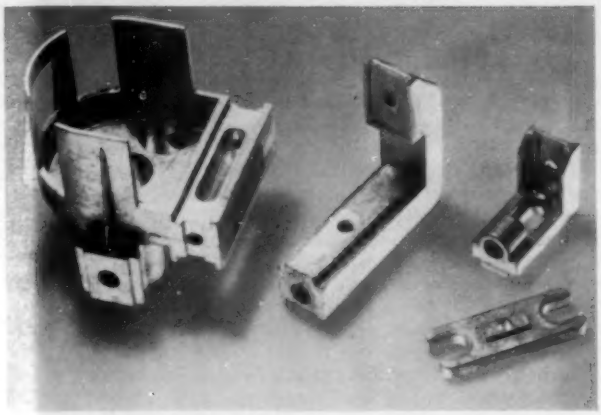
Sound Damping Properties of Magnesium May Be Useful In Products Like These . . .

- Typewriters and other office machines.
- Vacuum cleaners, mixers and other household appliances.
- Radio, telephone and communications devices.
- Pneumatic tools, electric motors, portable tools.
- Home workshop equipment.

POWDER METALLURGY



DIE CASTINGS



Two Processes Build A Better Product

By **A. G. CARTER,** President
Carter Products Co., Inc.

WHAT are the requirements of a dependable band saw guide? Here are some of the considerations, and a description of the way Carter Products Co., Inc., is meeting them in the construction of their band saw guides:

1. *It must have a strong, rigid frame to support the various guide members in precise alignment.* The frame is a zinc base die casting, produced by New Products Corp., cast to close tolerances with adequate ribbing and fillets to give the needed strength and rigidity.

2. *It must be adaptable to as many different makes of saw as possible, with few or no changes or extra pieces.* By careful placement of cored holes which are afterwards reamed to size, most mounting studs on industrial saws can be accommodated.

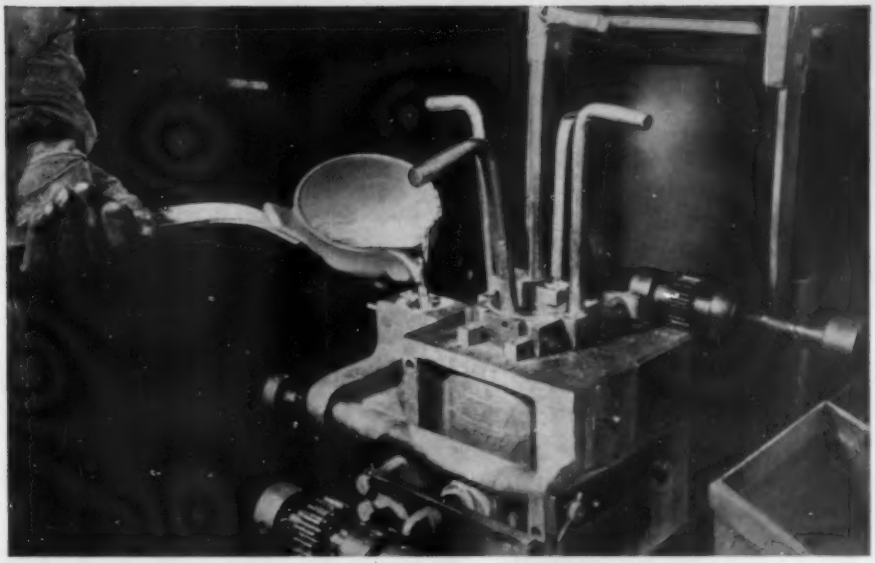
3. *It must be completely reversible for use both above and below the saw table.* The basic frame is completely symmetrical about a centerline, and duplicate holes are provided for mounting slides, etc., at each end. These are integral conformations of the die castings and require no additional machining.

4. *It must be as frictionless as possible.* Minimum friction is achieved by either a special, oil-sealed ball bearing or, for some service, an oil impregnated metal powder bearing wheel and stem, which serves as the bearing against which the back of the blade rides. Thus, sliding against a fixed surface is replaced by rotary contact. The jaws which hold the blade in vertical alignment are also oil-impregnated powdered metal parts, molded to exact size and with the required flatness. Oil impregnation reduces friction to a minimum.

5. *It must have long, maintenance-free life.* For this service, the zinc die cast frame is as strong and rigid as one of cast iron would be. Where friction could occur, oil impregnated powdered metal parts are customarily used. These parts have shown greater wear resistance (i.e., longer life) than comparable steel parts and at lower manufacturing cost.

6. *It must be relatively low cost.* Because both die casting and powder metallurgy processes are so accurate, substantially no machining is done prior to assembly, other than the drilling and tapping or reaming of a few holes. Also, because both are high speed production methods, the per-part costs are low. Were it not for these two metal-forming processes, the cost of these band saw guides would be so much higher that it is questionable if they could be marketed economically.

dag DISPERSIONS



Use improved mold coatings to get better aluminum castings

Problems which arise in casting aluminum in permanent molds—over-rapid chilling, rough surfaces, sticking to the molds—are solved by the use of 'dag' dispersions.

'dag' dispersion No. 193 (vermiculite in water) is now widely used in the permanent-mold industry to provide a smooth, tenacious, insulating mold coating which allows the melt to remain fluid longer and flow better. Proper application of this valuable 'dag' dispersion produces a smooth, durable coating which gives first-class castings every time.

An overspray of 'dag' Colloidal Graphite on top of an insulating coating helps in ejecting the casting and prolongs the life of the vermiculite wash. Cores are usually coated with 'dag' Colloidal Graphite, and it can be used alone on molds when casting sections are relatively thick.

To get more information regarding 'dag' dispersions for insulating and lubricating coatings, write us and ask for Bulletin No. 426-W10.

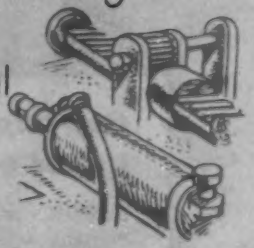
Dispersions of molybdenum disulfide are available in various carriers. We are also equipped to do custom dispersing of solids in a wide variety of carriers.

ACHESON COLLOIDS COMPANY

PORT HURON, MICHIGAN

...also ACHESON COLLOIDS LIMITED, LONDON, ENGLAND

use 'dag' dry films for trouble-free lubrication

A permanent mold casting is made by pouring the molten metal into a metal (hence permanent) mold which in its simplest form consists of two mating halves into which the negative cavity of the part to be produced is machined, along with appropriate feeders, gates, vents, etc. Simple hinges and clamps may be the only mechanical aids for this type of simple mold; but for larger more complicated castings elaborate molds are required which use racks and pinions, hydraulic cylinders and levers to withdraw cores from internal  openings. When shapes are such that a steel core cannot be withdrawn from some portion of the casting, sand cores are used, similar to those used in sand casting. This process is called semi-permanent mold casting. After casting, the metal is allowed to cool slowly and then the gate of casting is removed from the mold.

One of a series of basic facts about the

pmm *processes for designers and buyers*

Permanent Mold Casting Process

WHAT IT IS One of the oldest of precision casting methods, the beginning of permanent mold casting is lost in antiquity. Whenever molten metal is fed by gravity, into a non-expendable mold, one form of the permanent mold casting process is used. Today, the process is more rigidly defined as a casting process using a permanent mold made of metal, generally cast iron or steel.

A negative of the part to be made is formed in the metal mold with due allowance for metal shrinkage necessary machining stock, etc. Gates, risers, vents, runners and any other appurtenances necessary to convey the molten metal to the mold cavity are made as integral parts of the metal mold.

Because no pressure is applied to the metal when it is poured, other than simple pressure due to gravity, the molds can be of simple construction and no complex or massive machines are needed to hold the mold halves together.

In its simplest form, two matching mold halves are made with the parting so arranged that the casting can be easily removed when the mold is opened. The two members are clamped together with either a vise arrangement or hinged and held together by a simple "C" clamp.

Sometimes no cores are used, but when coring is necessary, simple hand-operated slides are installed which are generally pulled before the mold is opened.

As the parts to be cast become larger and more complex the mold halves are mounted on some sort of press that may be opened and closed with a rack and pinion or other mechanical arrangement. In this case cores may be pulled by hand or with separate racks and pinions on each slide.

The next most obvious step is some sort of air or hydraulic operated mechanism to replace the racks and pinions. In every case thus far discussed all parts of the mold are metal.

Some designs, however, will not permit the use of a metal core because no method of core pulling can be worked out. In these cases, representing a fairly large percentage of the permanent mold castings, resort is made to so-called semi-permanent molds. Here the major mold members and all cores that can be operated from the outside of the mold blocks are metal, but cores that are not operable in the usual manner are standard sand cores.

In semi-permanent molds the sand cores are positioned before the mold halves are closed. After pouring and removal of the casting from the mold the sand core is shaken out in the same manner as used in ordinary sand casting.

WHEN TO USE IT Permanent mold casting offers its greatest economy whenever a casting run is moderately long, where the dimensional precision achieved, imparted by a carefully machined mold, and the improved surface finish of the casting will show a sufficient saving in machining to pay for the higher mold costs.

No reliable figures can be given for dimensional accuracy since that will vary with the size and complexity of the part being cast and the metal in which it is cast. Within a mold cavity when metal cores are used, good foundry practice and careful mold construction allow holding tolerances of less than ±0.010 per inch and in some cases as low as ±0.005 per inch.

Across parting lines considerably greater latitude must be allowed and good general practice is to allow ±0.020 minimum. With sand cores the same tolerances are allowed as for normal sand castings.

Physical Properties

Design Considerations

Metals Used

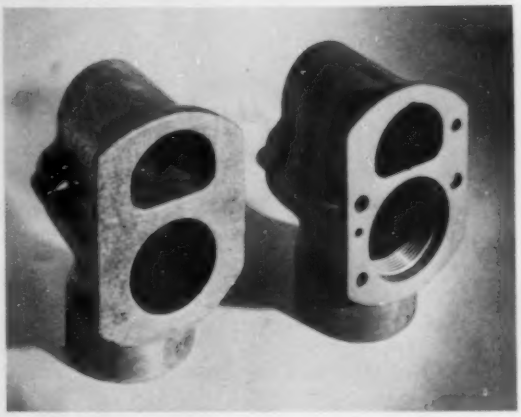
Typical Applications

Some Advantages

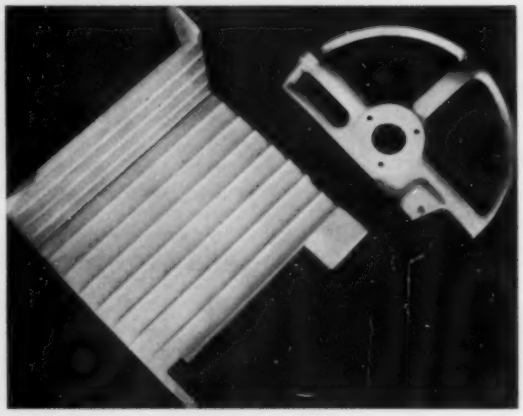
Typical Physical Properties

ALLOY* (ASTM)	Hardness (BHN)	Yield Str. (0.2% Mpsi)	Tensile Str. (Mpsi)	Elongation (2 in.%)
ALUMINUM				
S5A	45	9	23	10.0
SC64A	70	16	28	2.0
C572A	80	24	30	1.0
CG100A				
T52	100	31	35	1.0
T551	115	35	37	<0.5
T65	140	36	48	<0.5
SN122A				
T551	105	28	36	0.5
T65	125	43	47	0.5
CS104A	100	24	30	1.5
GZ42A	60	16	27	7.0
SC64C	85	19	34	2.5
SC51A				
T51	75	24	30	2
SG70A				
T6	90	27	40	6.0
T7	70	24	33	5.0
MAGNESIUM				
AZ63	50	14	29	5
AZ92	77	14	24	2
A10	54	13	22	2
M1	33	4.5	14	5

*Data from Metal Data, Second edition, 1952, compiled by Samuel L. Hoyt.



Aircraft Components



Food Processing Equipment

Sound Metal Structure — Prime Property of Permanent Mold Castings

Surface finish is more difficult to assess. Here the end result will be influenced by the surface finish of the die, the type and quantity of lubricant used, temperature of the metal as it is poured, etc. Next to sand cores, normal green sand surfaces are achieved.

In general, then, one can say that permanent mold casting may be used, within the limits of castable shapes, whenever the subsequent machining economies will offset increased tooling charges.

One other factor may enter. Certain classes of parts require a degree of soundness than cannot be achieved by either sand casting or die casting. For these parts, permanent mold casting is preferred.

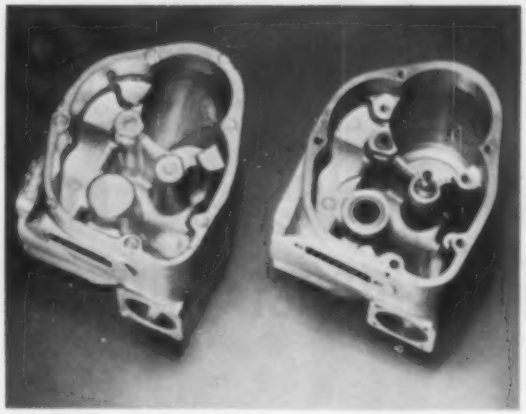
If major machining must be done after casting, regardless of the casting method employed, and minor surface defects such as small blow hole, inclusions, porosity, etc. will cause rejection of the part, then a permanent mold casting will often be the soundest casting that can be achieved. Where either pressure or vacuum tightness is essential, again permanent mold casting may be the only process that will give a satisfactory product with low rejections.

Structurally, permanent mold castings exhibit better properties than a sand casting. The faster rate of cooling promotes a finer grain structure in most metals and allows less time for segregation of either alloying constituents or any impurities that may be present. Grain boundary segregation is materially lessened so that intergranular failure and intergranular corrosion are both decreased. Tensile strengths, impact strength, ductility and other mechanical properties are improved and a greater uniformity of properties from spot to spot in the casting results.

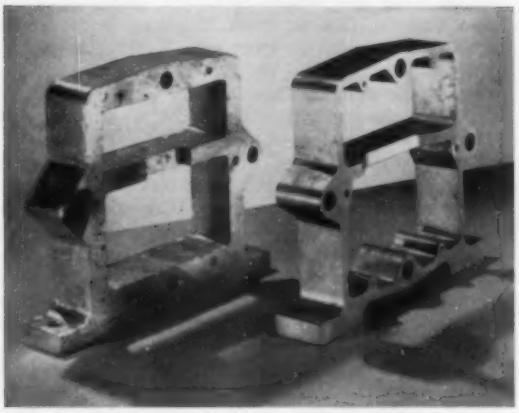
CASTABLE METALS

By far the greatest percentage of permanent mold castings are made in non-ferrous metals, particularly aluminum, brass and bronze. A separate report is included here concerning copper-base permanent mold castings. An increasing number of permanent mold casting are made in iron. Some progress is reported on casting the higher melting point metals through the use of ceramic mold washes.

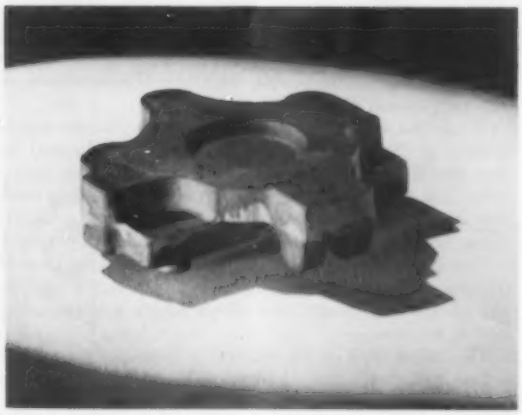
Automotive Specialties



Hydraulic Devices



Electrical Equipment



Gray Iron For Machine Tools

COSTS The cost of tooling for the permanent mold casting process is higher than for a comparable sand casting. Any cost advantage must come in the reduced machining on the casting. In many cases, however, even very high tooling costs are justified by the machining savings and by the superior product produced. Tooling as high as $10,000, while not usual, has been found economical. Labor costs are lower than for sand casting due to the higher rate of production and the lower clean-up costs, but may be higher than for die casting, particularly when complex coring is involved or sand cores are used. The average cycle is probably about double that of die casting for the same part in the same metal.

APPLICATIONS There is hardly a field of industrial activity where metal is shaped that does not employ some permanent mold castings. Typical of the industrial classes that employ large numbers of these castings are: transportation, communications, optical goods, business machines, wheeled goods, toys, sporting goods, textile machinery, home appliances, printing machinery, business and vending machines and many others.

Quite frequently the permanent mold casting process is used during intermediate stages of product acceptance. During early production when quantities are very limited, castings may be made in sand. As the acceptance of the product increases permanent mold castings are used and finally, if volume becomes great enough the part may go to a die casting. This genesis assumes, of course, that some metal such as aluminum or magnesium is involved. Brasses and bronzes seldom pass the permanent mold casting stage, and iron never goes into die casting.

As a very broad generalization any casting that is made in moderate numbers and on which appreciable machining must be done, if sand cast, will be more economically cast in permanent molds. Where better than sand cast properties are needed, permanent mold castings may be the solution; and where either complexity of shape or soundness preclude a sand casting or show a high rejection rate then again permanent mold castings may be the best.

The Brasses And Bronzes →

How To Design For The Copper Alloys

THE wide range of copper-base alloys that can be cast in permanent molds makes available to the designer a very useful choice of properties. Few engineers are acquainted with the diversity of alloys that can be cast with the accuracy, smooth surface and dense grain structure that are characteristic of the permanent mold process.

While no one foundry casts all alloys, the availability of these copper-base castings is indicated by the chart that accompanies this article. This tabulates the alloys cast by five foundries, together with the properties by which the designer can evaluate these metals for possible inclusion in his own product.

The general statements covering permanent mold casting are as true of the brasses and bronzes as they are of the aluminum base alloys which are generally better known.

The quick chill of the relatively cool molds develops a fine grain structure and corresponding increase in physical properties as compared with sand castings.

The steel mold imparts smoothness, dimensional accuracy and control of wall thickness not possible in sand casting. Although there are variations in foundry practice pertaining to melting, casting, mold design, etc., the design limits reported by several foundries for casting brass and bronze shows close consistency.

Tolerance generally considered normal "commercial" practice is ± 0.010 for the first linear inch, with an additional 0.005 for each additional inch. On selected dimensions, it is sometimes possible to hold dimensions somewhat closer than this, but the designer should consult with the supplier of castings to determine the feasibility of exceptionally close dimensions in any specific instance.

Mold draft is usually negligible, since the casting will shrink away from the side walls. In most cases, cores and inside walls need a taper allowance of 0.010 per inch.

Coring can be accomplished either with steel or sand cores. The limit on steel cores (except when costly collapsible cores might be used) is the demand that the cores have no undercuts which would prevent them from being pulled straight from the casting. Cores can be pulled at any angle provided there is no undercut or interference between cores in pulling. Sand cores can be used when steel or collapsible cores are not practical, as in the case of intricate, internal cavities.

Wall sections, one foundry states, can be cast as thin as 0.100 and, where necessary, small areas can have walls as thin as 0.080. However, with exceptionally thin walls, as with excessively close tolerances, the stricter the requirements, the higher the price of the casting. One foundry suggests a rule-of-thumb on wall thickness from a minimum of 3/32"-⅛" to a maximum of 1½"-3½".

Size of casting ranges, in normal practice, from a few ounces up to 45 pounds. The minimum size that can be produced economically runs about .05 lb, while the average casting now produced is believed to lie in the size range of ½ to 2 pounds. The largest saving can be achieved (in comparison with sand castings) in the 6 to 7 pound class, although factors in individual castings will affect this, such as the amount of machining that is saved, etc.

Inserts are readily incorporated into copper base permanent mold castings, and commonly used where the properties of steel or some other material need to be combined with those of the copper base material.

Good design practice for brass and bronze permanent mold castings can help to obtain best quality castings at lower cost. For example, a liberal use of fillets, elimination of sharp corners, provision of 1/32" or more radii wherever possible, uniform wall

Continued on page 50

THEY'VE GOT TO BE TOUGH . . .

REPEATED LOCKING and unlocking of this aircraft fueling nozzle flange would wear out a softer metal, but the aluminum bronze permanent mold casting, vacuum cast by Aurora Metal Co., has plenty of wear-resistance. It is also strong enough so that the entire nozzle assembly can be supported by the three small lugs on the end of the flange. What this new fueling system does is to pump gas into airplanes under pressure at a rate of better than 600 gallons per minute, replacing the slow gravity-feed methods. The aluminum bronze casting, measuring 4½" OD and 1½" high, has enough strength to permit incorporation of reliefs on the outside of the casting, reducing weight below that of the sand casting it has replaced.

Use These Alloys In Your Product:

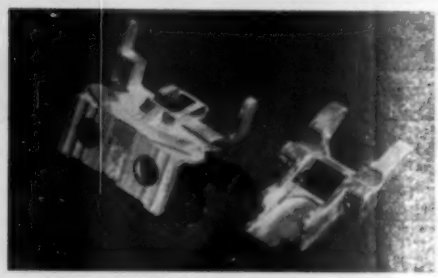
ALLOY*	Comparable Spec.	COMPOSITION										PROPERTIES					
		Cu	Al	Zn	Fe	Ni	Mn	Pb	Sn	Si	Other	Ult. Tens. p.s.i.	Elong. %/2"	Yield Str. p.s.i.	Rockw. "B"	Brinell	Elect.** Cond.
Aluminum Bronze (1)	ASTM B-148-49 9A	88	10		2							80,000	17-24	36,000	65-85		16
" (2)	SAE 68B	88	10		2							80-100,000	10-20	30-40,000	85		12.5
" (3)	ASTM B-148-42T Grade B	89	9.8		1						Max. .5	73-85,000	25-40	26-38,000	66-74		
" (3)	" Heat Treated	89	9.8		1						Max. .5	78-100,000	3-14	45-60,000	87-93		
" (3)		88.5	10.5		1						Max. .5	80-90,000	20-25	35-45,000	75-81		
" (4)	ASTM B-148-52-9B	86-89	10-11		1-1.5							80,000	17-26	36,000	75-85		12
" (5)		Bal.	11.0		3.75						Max. .5	100,000	12	38,000		175	
" (5)	Heat Treated	Bal.	11.0		3.75						Max. .5	105,000	12	47,500		220	
" (5)		Bal.	10.5		4.5	5.0					Max. .5	110,000	8	55,000		230	
" (5)	Heat Treated	Bal.	10.5		4.5	5.0					Max. .5	115,000	10	66,000		230	
" (5)		Bal.	14.0		4.75						Max. .5	92,500	.5	70,000		325	
" (5)		Bal.	15.0		5.0						Specl. Elem.	88,000		65,000		375	
Nickel-Aluminum, Bronze (1)	ASTM B-148-49-9D	82	10.5		3.5	4.0						95,000	12	43,000	85-95		15
" (3)	ASTM B-148-42T Gr 9A-2	80.5	10.5		4.25	4.75					Max. .5	90-100,000	5-10	50-60,000	89-93		
" (4)	ASTM B-148-52-9D	Bal.	10-11		3-5	3-5.5						90,000	10	40,000	85-95		
High Nickel Alum. Bronze (3)		76	12		5	7					Max. .5	105-120,000	0-5	80-85,000	100-110		
" (4)		Bal.	11.5-12.5		4.5-6.5	6.5-7.5						115,000	3	82,000	105		
Manganese Bronze (1)	ASTM B-147-49	57	1.5	38.5	2		1					75,000	20	30,000	55-65		22
" (4)	ASTM B-147-52-8A	56-59	Max. 2	Bal.	Max. 2		1	Max. .5	Max. 1			76,000	15	33,000	60-70		
Yellow Brass (1)		59.5	0.5	40								45,000	20-25	30,000	55-65		30
" (4)	ASTM B-146-52-6C	59	0.5	Bal.							Max. 1.0	40,000	25	11,000			28
Silicon Bronze (3)		81.5		14						Si 5	Max. .3	55-70,000	15-20	25-30,000	70-75		

*Alloys, compositions and properties charted here are listed by courtesy of the following foundries:

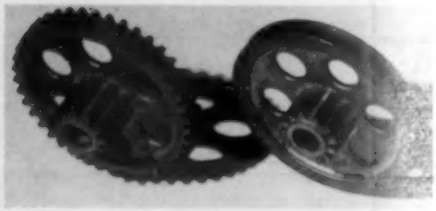
(1) Alcaloy, Inc., Trenton, N. J.
(2) Bronze & Steel Die Casting Co., Plano, Ill.
(3) Aurora Metal Co., Aurora, Ill.
(4) Pressco Casting & Mfg. Corp., Chesterton, Ind.
(5) WW Alloys, Inc., Div. of Fansteel Metallurgical Corp., Detroit, Mich.

**Percent of copper

CAST CHAIN comes from the mold completely joined with accessory parts cast in place. Courtesy Alcaloy, Inc.



ELECTRICAL EQUIPMENT uses aluminum bronze permanent mold castings like those for a circuit breaker. Courtesy WW Alloys Div., Fansteel Metallurgical Corp.



WORM WHEEL, spur and pinion in aluminum bronze are used in heavy duty stoker transmissions. Courtesy Pressco Casting & Mfg. Corp.

ASSEMBLY of forged cup, two wire handles and a machined connector has been replaced by this aluminum bronze vacuum cast laboratory flash point determinator. Good strength at elevated temperatures, good looks and corrosion resistance are obtained from the casting. Courtesy Aurora Metal Co.

sections or gradual blending between varying wall sections . . . will all expedite the production of sound, low cost castings.

Molds for permanent mold brass or bronze castings have longer life than those used in die casting the copper base alloys, probably because of the smaller thermal shock produced by the slower casting cycle. Tool life is reported commonly to range from 1,000 to 150,000 pieces, depending upon the shape of the part and the accuracy required in the finished piece.

Some variations are found in casting techniques. One foundry employs a unique method of vacuum evacuation of the mold, which creates a differential pressure to help fill the mold completely to eliminate voids, shrinks and cold shuts. In some foundries, the molds are whirled centrifugally or are attached to a tilting type furnace to provide an extra head of molten metal.

The uses of brass and bronze permanent mold castings are very diversified: domestic garbage disposal units make important use of them, as do almost all steel strapping tools for packaging. Impellers of various types are in routine production, gaining the physical strength of the alloys, together with the smooth surfaces and accurate dimensions.

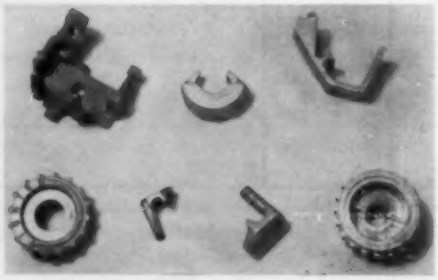
Non-sparking tools are produced in a bronze alloy for safety in explosive atmospheres.

One specialty job illustrated here is the production of continuous chain and chain-fittings, which come from the mold already joined.

Conventional machine parts are often produced by permanent mold castings: this includes heavy-duty transmission components, generator parts, gears and gear blanks, structural elements on machine tools, and electrical instrument brackets.

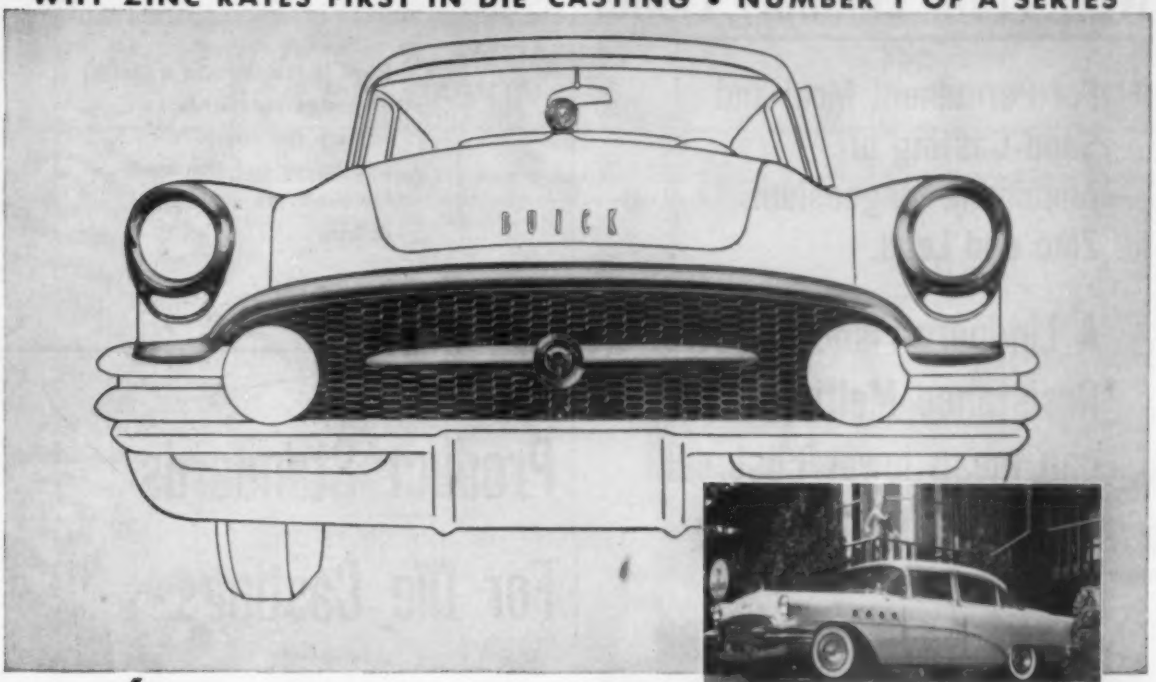
An interesting special application of aluminum bronze permanent mold castings are the slipper guides used in steel mills. At the other end of the scale are important components used in milk bottle capping machinery.

The potential use of these alloys as formed by permanent molds, is much greater than is at present appreciated. Wherever heavy-duty metal parts require special, tough or strong copper base materials, permanent mold casting offers one of the most effective fabricating methods.



INDUSTRIAL components, such as this group of typical machine parts, are cast in copper base alloys. Courtesy Alcaloy, Inc.

WHY ZINC RATES FIRST IN DIE CASTING • NUMBER 1 OF A SERIES



finishability as typified by BUICK

The distinctive beauty of the 1955 Buick front end bright-work bears impressive testimony to one of the principal reasons why ZINC is the most widely used die casting metal. Because they are ZINC, these die castings are *economically* finished in a handsome, durable chromium plate. No other die casting metal can match ZINC in providing both castability and plateability at low cost.

You have a complete choice of finishes when you specify ZINC die castings for the assembly of your products. Electroplating of ZINC die castings, especially with copper-nickel-chromium, is done on a very large scale. Or you may choose from a variety of organic coatings, such as enamels or lacquers, with assurance that a minimum of surface preparation will be required on the smooth as-cast parts. If a decorative treatment is not needed, but unusual exposure conditions prevail, ZINC die castings can be protected inexpensively by the application of Cronak*—a dichromate dip.

Our advertisments in this magazine in the months ahead will explain why and how ZINC die castings cut costs and improve the salability of a variety of products. Send for a copy of the new brochure shown here and contact any commercial die casting company regarding your particular production problems.

*For full details of the Cronak process write to The New Jersey Zinc Company, 160 Front Street, New York 38, N. Y.

Send for your copy

The New Jersey Zinc Company
160 Front St., New York 38, N. Y.

ZINC
FOR DIE CASTING ALLOYS

The Research was done, the Alloys were developed, and most Die Castings are based on

HORSE HEAD SPECIAL (99.99 + % Uniform Quality) ZINC

For more information circle No. 49 on the Reader Service Card

New From Lindberg-Fisher

For Permanent Mold and Sand Casting of Aluminum, Magnesium, Zinc and Lead.

A Lindberg-Fisher Electric Resistance Melting Furnace can mean lower cost per lb. of finished casting.

These furnaces eliminate localized heating of metal, eliminate gas absorption, because there are no products of combustion present. Higher production results, due to less operator fatigue. Exhaust fumes and smoke are nonexistent and radiation loss is held to an absolute minimum by use of high quality insulation.

Longer crucible or pot service and low furnace maintenance are obtained with the patented long life, low voltage elements.

Can also be used as a holding furnace on die casting applications.

Write for Bulletin No. 320

See this furnace in Booth No. 666 at the ASTE Exposition, Shrine Exposition Hall—Los Angeles.

LINDBERG FISHER **MELTING FURNACES**

A Division of Lindberg Engineering Company

2463 WEST HUBBARD STREET, CHICAGO 12, ILLINOIS

Here is the third in a series of design standards to help the engineer and buyer get the most for their die casting dollars . . .

Product Standards For Die Castings

Additional copies of the Standards are available without charge. If you want a set, drop a request to the editor, PMM, and we'll forward it to the ADCI.

TOLERANCES pertaining to moving parts of a die casting die constitute the third in a series of engineering standards established by the American Die Casting Institute, and published here.

The first two standards, Linear Dimension Tolerances and Parting Line Tolerances, were published in PMM in March, while other standards on Draft Requirements For Walls and Flatness Tolerances will appear in May and June.

This series of product standards, drawn up by the ADCI to help designers and buyers of die castings to get the most for their money, will include about 40 standards on engineering, metallurgy and commercial practice.

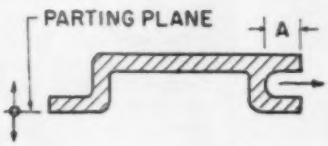
For release in July are standards on Die Cast Threads; Fillets, Ribs and Corners; Trimming; Ejector Pin Marks; Alignment; Concentricity; Machining Stock Allowances; and Lettering, Engraving and Honeycomb Design.

PRODUCT STANDARDS FOR DIE CASTINGS

ADCI-E3-55T
MOVING DIE PART TOLERANCES

NOTE—The values shown herein represent normal production practice at the most economic level. Greater accuracy involving extra close work or care in production should be specified only when and where necessary since additional cost may be involved.

MOVING DIE PART TOLERANCES — IN ADDITION TO LINEAR DIMENSION TOLERANCES



Moving Die Part Tolerances, in addition to Linear Dimension Tolerances, and Parting Line Tolerances must be provided when a moving die part affects a linear dimension.

"Projected Area" is the area, in square inches, of the portion of the die casting affected by the moving die part.

ADDITIONAL TOLERANCES IN INCHES

Projected Area of Die Casting Portion	DIE CASTING ALLOY			
	ZINC	ALUMINUM	MAGNESIUM	COPPER
Up to 10 sq. inches	± .004	± .005	± .005	± .010
10 to 20 sq. inches	± .006	± .008	± .008	—
20 to 50 sq. inches	± .008	± .012	± .012	—
50 to 100 sq. inches	± .012	± .015	± .015	—

NOTE: The above tolerances are to be added to Linear Tolerances worked out for a dimension as provided in Standards E1 and E2.

AMERICAN DIE CASTING INSTITUTE, INC.
366 Madison Avenue New York 17, New York

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TITANIUM IN IRON & STEEL, by George F. Comstock. Published for The Engineering Foundation by John Wiley & Sons, Inc., New York, N.Y., $6.00. The third volume in the new monograph series.

Some elements are rare because of their scarcity, while others are classed as rare only because their use and our knowledge of their properties and effects is fragmentary. Titanium belongs to this latter group of elements.

While the use of titanium as a deoxidizer in iron and steel is well established and the stabilizing action on nitrogen and carbon well known; other effects are less well known to the majority of metallurgists. This latest monograph attempts to fill this gap by bringing together the known material on the additions of relatively small amounts of titanium to iron and steel.

The subject matter is carefully grouped for easy reference, each chapter as complete and authoritative as present knowledge will permit.

The chapter headings indicate the break-down by subject and the comprehensive coverage given the subject: Titanium as a Deoxidizer in Rimmed and Killed Wrought Steels; The Effects of Titanium on Nitrogen and Sulphur in Steel; Titanium in Cast Steel; Titanium in Cast Iron; General Effects of Titanium as the Sole Alloying Element in Pearlitic Steels; Titanium in Low Alloy Steels; Carbide Stabilization by Titanium in Unalloyed Steels of Less Than 4% Alloy Content; Carbide Stabilization by Titanium in Steels Containing Over 4% Chromium; Titanium in Precipitation-Hardening Steels and in Complex Heat-Resistant Alloys.

A bibliography of over 280 references is included.

DIRECTORY OF COMMERCIAL AND COLLEGE TESTING LABORATORIES published by the American Society for Testing Materials, Philadelphia, Pa.; price $1.00.

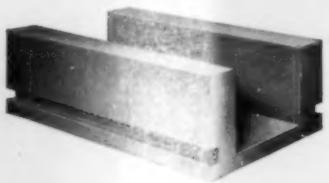
The directory is the successor the Miscellaneous Publication M 187 of the U. S. Dept. of Commerce, National Bureau of Standards, "Directory of Commercial and College Laboratories. By agreement between ASTM and the Dept. of Commerce, this and future issues of the directory will be published by ASTM.

The Directory lists the locations of testing laboratories equipped and prepared to undertake testing on a commercial or fee basis. Information is given concerning 278 commercial testing laboratories and their 151 branches or offices. There is also given a list of 86 college laboratories that do testing under certain conditions.

DIE CASTERS! DIE MAKERS!

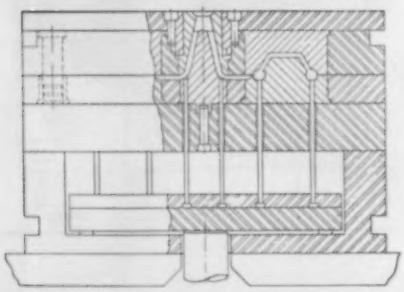
SAVE on Die Construction Time!

With D-M-E Standard **EJECTOR HOUSINGS!**



GROUND FLAT, PARALLEL and SQUARE . . .
Ready to be drilled and assembled into *Your Die Cast Die!*

A TYPICAL DIE CAST DIE
Using D-M-E Standard Components



D-M-E Standard Ejector Housings are ideal for use in die casting machines having hydraulic ejection, as shown in the illustration.

The 17 different standard sizes, corresponding to D-M-E's Standard Cavity Retainer Sets, give you a wide dimensional range to suit your die casting needs.

You'll find that they can save you valuable time and money on your next die cast die . . . So, START SAVING NOW!

You'll SAVE TIME and MONEY with D-M-E STANDARDS!

For complete data and prices check Page 133 of your NEW D-M-E Catalog . . . . . or Contact your nearest D-M-E Branch TODAY!

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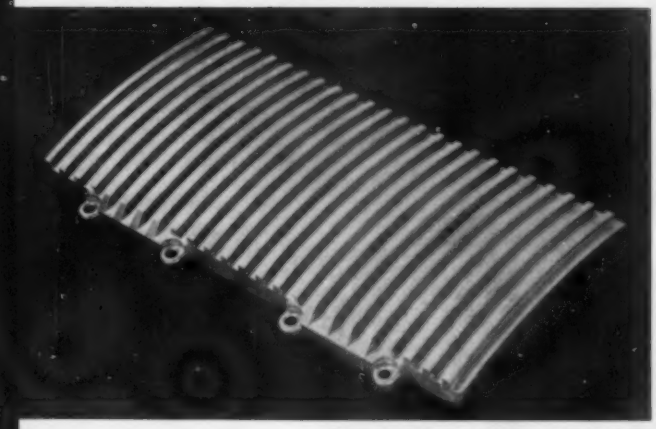
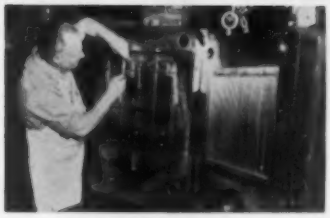




Thin-Walled Castings In Aluminum Alloy Are Strong, Accurate Escalator Parts

Close-Meshed Parts For Stairs That Move

LATEST move by the Otis Elevator Company, New York, N.Y., to improve operation and increase safety of their escalators is a ribbed riser, die cast of aluminum. The first of the new-type moving stairs will be installed at a Marshall Field store.

The trend toward aluminum has been justified by weight savings, say Otis engineers, and by the close tolerances made possible by modern die casting methods. In the past, wood, molded rubber and die cast zinc were specified for escalator parts. While many of these are still giving excellent daily service, advanced engineering called for materials and methods that would simplify machining and assembly, as well as reduce weight.

More than a decade ago Otis started specifying aluminum die castings for stair components. Close cooperation between company design engineers and the die caster, the Precision Castings Co., resulted in the new escalator, using alloy 308 for treads and risers, alloy 360 for the yokes.

Examination of the treads and risers shows that they have many long, thin-walled (1/10 inch) sections — which in a die measuring more than two ft in either direction could easily lead to casting difficulties. The supplier, however, agreed to cast the escalator parts as designed, and proceeded to build appropriate dies. Through adequate gating and venting, Precision found it possible to fill the long, narrow cavities completely.

Spacing of treads and risers is extremely critical, for not only must they mesh with each other, but they must slide into the comb at the top (or bottom) of the escalator perfectly, to avoid breakage. Although parts are completely interchangeable and repairs do not take long, Otis aims to hold shutdowns to a minimum. The die caster is therefore held to tolerances of ±0.003 on decimal dimensions, not more than ±0.015 for fractional dimensions. And warping simply cannot be tolerated. That's why each tread, before it leaves the die casting plant, is checked for flatness within 0.025 against a surface plate and corrected, if necessary.

Machining of treads and risers is handled in the shops of the Otis Elevator Company. Holes are drilled and tapped in the castings, and, after dip painting in a black enamel, the tops of treads are milled off.

There are two sizes of treads, one 12″ wide, the other 16″. (Both are 16″ deep.) Using these, and sawing a 16″ wide tread in half if necessary, any escalator width from 2′ to 4′ is easily made.

Technical Program Completed For Electroplaters' Convention

Titles of papers scheduled for presentation at the 42nd annual convention of the American Electroplaters' Society have been announced.

Completion of the technical program, to be held in Cleveland, June 20-23, 1955, is announced by Eugene L. Combs, general chairman. Mr. Combs reports that the subjects are calculated to cover the most significant operating areas for producing better finished products at lower cost to industry.

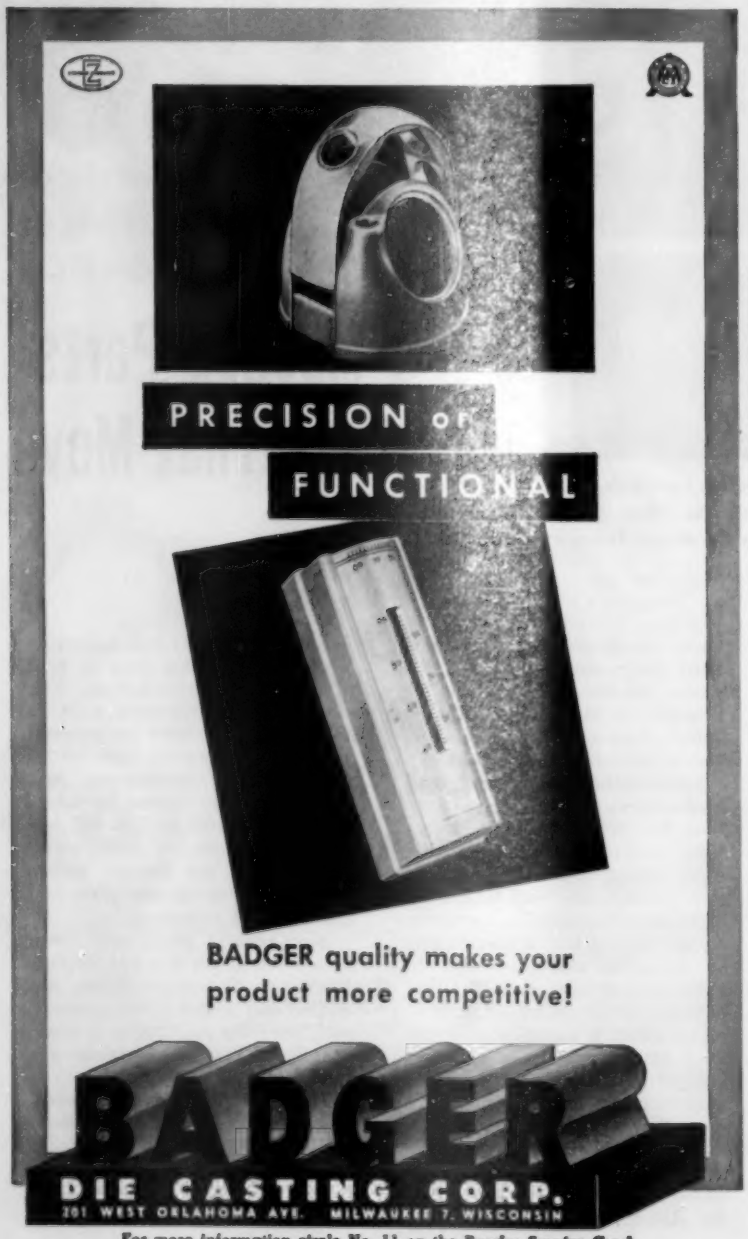
Here are tentative titles of the papers:

Liquid Level Control
Recovery of Waste Cyanide Zinc
Plating Powdered Metallurgy Bronze Parts
High Speed Brass Plating
Materials of Construction for Plating Rooms
Anodic Etch of Ferrous Parts Before Plating
Surface Preparation
Fatigue of Plated Steel Parts
Job Shop Costs
Tin Plating of Copper Wire
Nickel and Copper Plating on Coils
Copper Plating on Steel for Telephone Drop Wires
Effect of Ripple on Plating
Filtering and Handling of Chromic Acid Solutions
Handling of Waste and Waste Treatment
Finishing and Plating of Beryllium and Beryllium Alloy
Vacuum Metallizing
Anode Current on Phosphatized Copper Anodes
Flow Coating of Paint

Names, titles and company affiliations of speakers will be available soon, as well as abstracts of the papers themselves.

The Industrial Finishing Exposition, to be held concurrently with the technical sessions in Cleveland's Public Hall, will attract about 200 exhibitors of finishing equipment, services and supplies, according to Mr. Combs. Exhibits will occupy both the upper level hall and the lower level hall. Two meeting rooms, one on the upper level and another at the lower level, will house the technical sessions.

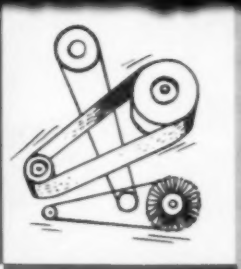
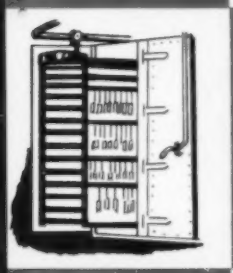
Last show sponsored by American Electroplaters' Society was held in Chicago in 1952.

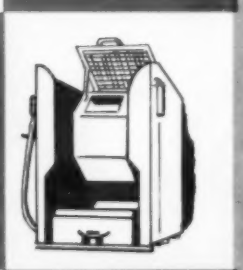


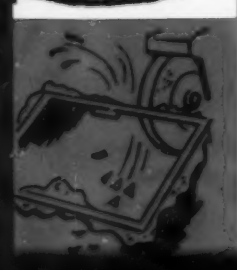
For more information circle No. 11 on the Reader Service Card

HOOKER-DUREZ CONSOLIDATE

Boards of Directors of Hooker Electrochemical Co., Niagara Falls, N.Y., and Durez Plastics & Chemicals, Inc., North Tonawanda, N. Y., have approved a formal agreement for the consolidation of the two companies, subject to approval by the stockholders of each company. Both companies have directed the calling of special meetings of their respective stockholders on April 28, 1955 at which time the consolidation agreement will be submitted for approval. It is anticipated that notices of the meetings and proxy statements will be mailed to stockholders on or about March 28, 1955.





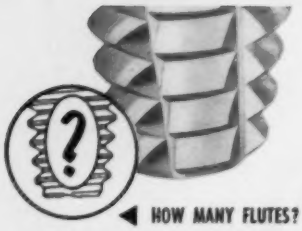
PMM

Finishing Section

Finishing includes all secondary operations performed on precision metal molded parts — up to and including final surface treatment. This section presents new information about the specialized methods, equipment and materials needed for finish-machining, assembly, surface preparation and final finishing of all precision metal molded parts.

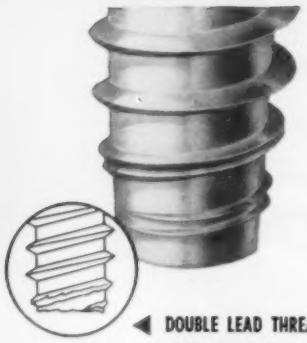
DIE CASTINGS • INVESTMENT CASTINGS • PERMANENT MOLD CASTINGS • PLASTER MOLD CASTINGS • POWDER METAL PARTS • SHELL MOLD CASTINGS

devoted to the specialized problems of finishing . . .



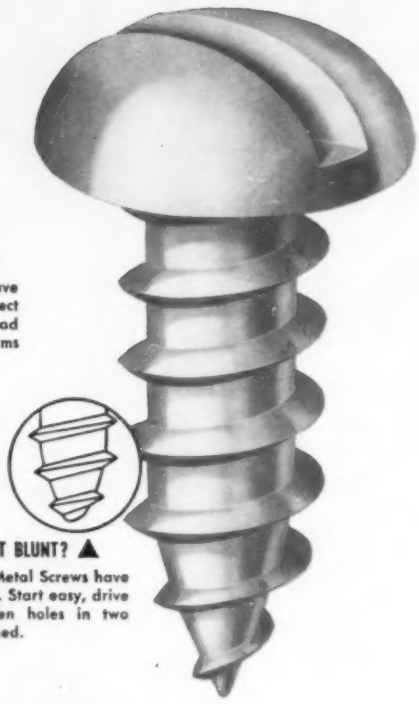
HOW MANY FLUTES?

P-K Type F Screws have *five* thread cutting flutes; easier to start, less torque to drive, cut clean threads all the way in.



DOUBLE LEAD THREAD?

P-K Type Z Self-tapping Screws have well-defined taper. Screw stands erect in hole and double lead thread means quick, easy starting; forms secure mating threads.



IS POINT BLUNT?

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the difference depen on the POINT

Bad points are hard to detect in the p e, but your cost sheets and customer complaints will soon show t ffects—job slowdown, parts spoilage, hidden weakness.

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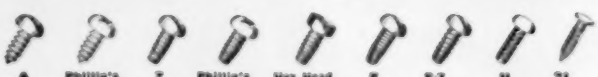

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A Practical Production Method

Colloidal Graphite Helps Braze Powdered Metal Parts

BY using sintered metal parts and joining them with low-temperature silver brazing alloys, a number of metal fabricators are realizing substantial savings in material and labor costs over their former method of machining these parts from solid metal.

However, because of its high porosity, sintered metal may be tricky to braze. When the sinters are made dense, they can be brazed normally. But when the parts are porous — typically in bearing applications—the porosity may interfere with the making of a good joint. Porous compacts tend to absorb the brazing alloy, much like a sponge soaks up water, leaving little or no alloy for the joint.

The technical laboratory of Handy & Harman, manufacturer of brazing alloys and fluxes, reports a convenient and practical solution for overcoming porosity problems when brazing sintered parts. The method consists of filling the pores just below the surface of the metal with colloidal graphite. The graphite forms a non-wettable, non-absorbent coating which prevents the alloy from soaking into the interior of the piece. Graphite emulsions, in either oil or water base, are available commercially for this purpose. In some cases the oil-base may be preferred because it usually penetrates into the metal more readily.

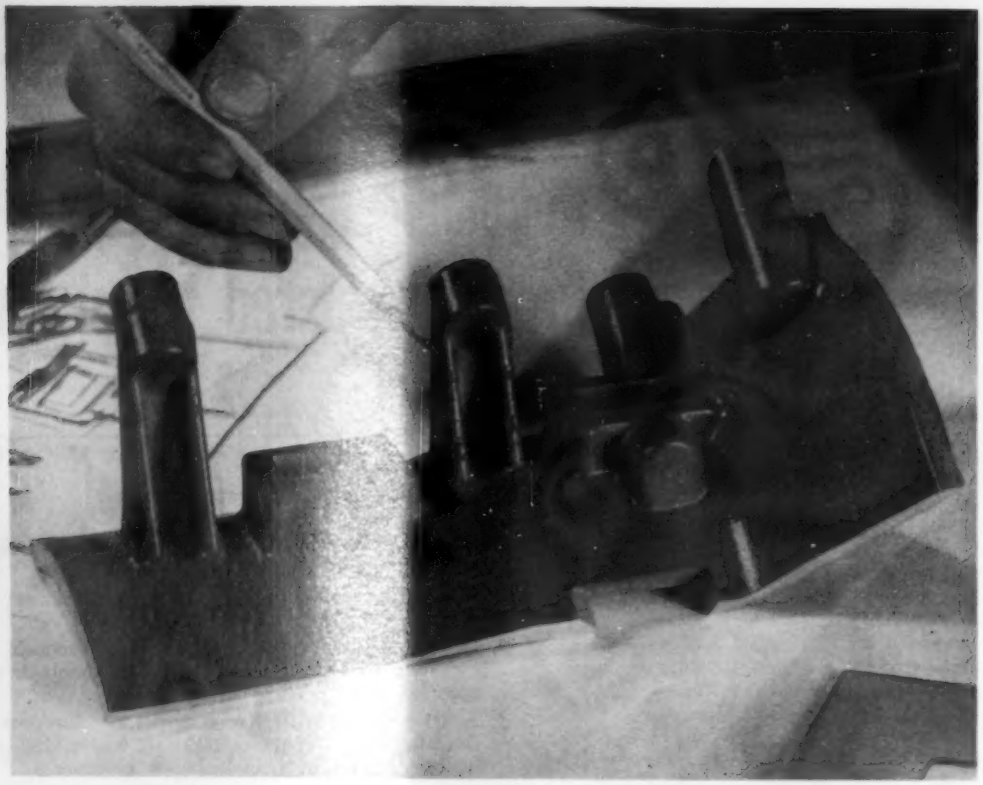
A number of firms have solved a difficult brazing problem with this process. Some of the high-production shops use the batch system for applying the graphite coating, drying and degreasing. By working with groups of parts, rather than individual parts, the handling time is reduced to about a minute per piece.

5 Steps To A Brazed Assembly

HERE is the step-by-step procedure recommended for preparing porous compacts for brazing:

1. Apply the colloidal graphite, by hand brush or dipping, to the surfaces to be brazed.
2. Let the solvent evaporate. The water emulsion will usually dry satisfactorily in air; the oil emulsion may require a short drying period in an oven.
3. After the piece is dry, remove the graphite coating from the *surface* of the metal using emery cloth or a brushing wheel with light contact pressure.
4. Degrease with carbon tetrachloride or other solvent, taking care not to handle the joint surface or touch it with oily materials thereafter.
5. When the piece is dry, flux and braze in the usual manner.

APPLYING colloidal graphite, in either an oil or water suspension, to a porous metal powder part prior to brazing. The five steps above detail how the process is carried out.



VITREOUS ENAMEL can be applied to irregular shapes, such as this aluminum casting with bosses, inclined planes, recesses, etc.

Vitreous Enamel For

What This Means To You

Vitreous enamel over aluminum castings:

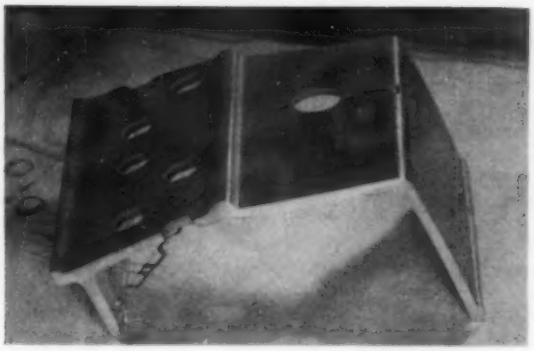
- Gives new physical properties such as thermal and electrical insulation.
- Gives a colorful, durable surface.
- Extends the useful range of application for aluminum castings.

ADDED to the pallet of the industrial designer is now another finish that extends his applications of dynamic color appeal and protective coatings. Combined with the inherent advantages of aluminum castings he now has the inert properties of vitreous enamel to broaden his scope of applications.

Vitreous enamel has been successfully applied to aluminum sheets for over five years: for structural panels — bath and kitchen tile — furniture and cabinets — marine applications — appliance parts and a variety of other uses.

Like all finishes, vitreous enamel frits developed for use on aluminum have certain limitations that were immediately recognized. Up to 16 months ago, practically no work had been done to adapt the vitreous finish to aluminum castings.

Working from the theory that the properties of vitreous enamel, combined with those of aluminum castings would create a new means of expression for the industrial designer, Monarch Aluminum Mfg. Company instigated its own research on the problem.



LARGE AREAS with cored holes can be coated effectively.

COMBINATION of polished aluminum plus enamel.

CAST-IN INSERTS can be enameled without difficulty.

ENAMELED casting can be sawed without spalling.

Aluminum Permanent Mold Castings

Advantage of Vitreous Enamel

Certain advantages are immediately apparent. These provide a starting point for the design engineer in his search for product improvement. It must be remembered that vitreous enamel is basically a form of glass, consequently possesses the chemically inert properties of glass. This fact creates a combination of color and surface protection that becomes a new tool in the hands of the design engineer.

Integral Color: The surface color of vitreous enamel is fused to the casting surface, becoming an integral part of the casting. The high gloss may be all the designer requires to meet the growing vogue for color.

Where practical, it is recommended that areas of natural finished aluminum be combined with vitreous enameled color. This is simple to accomplish by masking off areas.

Currently production is limited to a number of decorator tested colors. Ultimately Monarch expects to expand the color range from full bright tones to delicate pastel shades.

Color Durability: Through the use of vitreous enamel, color may now be employed on areas subjected to abrasion, corrosive influence of mild chemicals where other types of colored finishes are impractical. Vitreous enameled color on aluminum castings is light fast.

It resists fading and discoloration, will not strain, streak or lose color on exposure to detergents, salt water, mild alkalies or acids. Normal cooking temperatures or flame will not affect the color or deteriorate the surface finish.

Surface Protection: The surface film is 10 times tougher than normal alkyd-amine paint. It offers

a relatively hard scratch and abrasion resistant surface coating — easy to clean without marring under normal usage. Severe tests indicate that spalling is restricted to the area of damage.

Vitreous enameled castings can be used in fields where working conditions and atmospheric materials would normally attack other types of finishes or natural aluminum itself.

Thermal Insulation: Aluminum is known and frequently used for its excellent heat conductivity. Research indicates that vitreous enamel can be applied to areas of the aluminum casting to be used as a refractory. It will retard surface heat transmission in that area, releasing it in other directions.

Impregnation: In this field, vitreous enamel appears to offer many possibilities. Further research is being conducted. As a substitute for protective coatings on castings held in storage for long periods of time, vitreous enamel also appears promising. Color also could be used for coded identification at no extra cost.

Technical information summarized here is based on average castings used in laboratory tests. Because of variations in casting thickness, sizes, shapes and enamel coating applications, specific test results are not indicated. Potential results can be accurately calculated in determining product applications.

Abrasion Resistance: Vitreous enamel imparts to the aluminum casting a glass-hard surface, resistant to abrasion or wear. Although the low-temperature frits used on aluminum do not quite equal the resistance of frits used in the enameling of steel, a standard Taber abrader test indicates an excellent potential abrasion resistance on enameled aluminum.

Acid Resistance: Tests conducted using hydrochloric acid, citric acid, acetic acid indicate satisfactory resistance by the surface coating in general usage. Resistance to mild acids under normal use is rated acceptable.

Alkali Resistance: Resistance to normal chemical attack of mild alkalies is rated satisfactory. Reaction to normal washing agents has proven extremely good.

Salt Resistance: Salt spray tests conducted in accordance with federal specification QQ-M-151a indicate a definite resistance to spalling by edge corrosion.

Thermal Shock: Castings subjected to deep freeze temperatures of 10 F and oven heated for 2 hours at 400 F showed no evidence of chipping, flaking or lifting of the enamel and no discoloration. Subsequent similar tests conducted over a much longer period confirm the Lab report.

Flame Resistance: A flame of 1200 F directed onto the enameled surface for 15 minutes showed no evidence of any surface breakdown.

Electrical Insulating Value: A voltage breakdown rating of 500 volts per mil thickness is required for penetration.

Mechanical Design

Surface Areas: Potentially any exposed surface of an aluminum casting can be enameled. Design engineers should utilize the ad-

Continued on page 64

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vantages to be gained by using areas of natural finished aluminum in contrast to the vitreous enamel color. Specific areas can be masked to create most designs required.

When heat conductivity is an important function, the casting areas receiving or transmitting the heat should not be enameled. The composition of the low-temperature frits does not allow enameled surfaces to be used in contact with foods.

Casting Shapes: Exposed irregular surfaces, wall thicknesses, radii, bosses or other cross-section factors common to commercial castings can normally be enameled without undue trouble, maintaining a uniform coating of vitreous enamel.

Surface Finishes: Vitreous enamel can be applied directly over normal as-cast surfaces. Preliminary finishing operations can be added if desired to obtain a smoother gloss finish. This becomes simply a matter of final cost analysis. Many other finishing techniques can be combined with the enamel.

Final Fabrication: Vitreous enameled aluminum castings can be subsequently machined or finished, when required, without noticeable damage if proper care is exercised, it is believed. Assembly operations such as welding or brazing can conceivably be performed within the welding and brazing limits of the aluminum casting itself.

Metal Specifications: Initial production operations will be on aluminum permanent mold castings in one general purpose alloy that creates a bond between the metal and the enamel insuring maximum performance. The development research program will ultimately expand the scope of the process to other alloys and provide the necessary answers on successfully firing aluminum die castings at the high temperature that is required for successful operations.

Costs: Because of the wide range of casting applications, degree of surface finish required, and other factors impossible to predetermine, general cost factors have not as yet been established.

It does seem apparent that vitreous enamel finishing will be comparable to other types of finishing especially where multiple and complicated preliminary finishing operations are required.

How do your spray mask painting operations check on these points?

1. On an average die casting, like a nameplate or escutcheon, is your hourly output averaging about 200 or nearer to 500-800 parts per hour?
2. Are either your paint spraying, or mask washing, or both done manually, or have you introduced automatic equipment?
3. Are you losing operators' time by having too large a mask washer so that time is wasted going to and from the washer? What about fire hazard?
4. How many duplicate masks do you have for each spraying job on the line? How do you spray multiple color decorative treatments?
5. Are you getting maximum coverage from your paint? How heavily do you load the vehicle with pigment?
6. Are you losing money on mask washing solvents by attempting to blend your own, rather than buying fast-cleaning materials?

Here are tips on ways to make your painting operation more efficient . . .

How Much Can You Save With

Automatic Spray Mask Painting

BY HARRY SZCZEPANSKI
Sepanski and Associates

How efficient is your paint spraying department?

A producer or buyer of die castings who applies a finish to his castings usually knows, within a fraction of a cent, how much it costs to polish and buff each piece, how many pieces can be hung from a plating rack, how much electric current is consumed per square inch of electroplated surface . . . but this same finisher does not pay the same close attention, in many instances, to the actual costs of his painting operations, nor how much he may be wasting on out-of-date manual spray methods.

This is an important problem. Color is helping to sell many products in today's competitive market. It is especially true of the group of products that are housed, trimmed or built with die castings: household appliances, automotive trim, business machines, builders' hardware, vending machines, etc.

With so many millions of die cast parts to be painted, the question may well be asked, "How efficient is your paint spraying?"

How much can you save?

When a die casting requires a decorative paint finish through the use of spray mask operations, the cost of these operations is often excessive. Here's an example:

On a part requiring spray mask painting, Company "A" figured the job to be hand sprayed at 200 parts per hour and Company "B" figured it as an automatic operation at a rate of 500 per hour.

Cost for Company "A": 200 parts per hour — 5 hours per thousand @ $1.50 per hour plus 150% burden — $3.75 per hour x 5 hours = $18.75 cost per thousand parts.

Cost for Company "B": 500 parts per hour — 2 hours per thousand parts @ $1.50 per hour plus 150% burden = $3.75 per hour x 2 hours = $7.50 per thousand parts plus $2.00 depreciation for automatic paint spraying machine ($1.00 depreciation per hour) = $9.50 total cost per thousand parts.

The difference between $18.75 and $9.50 is $9.25 per two hour period by automatic spraying of parts, or $4.62 per hour x 2,000 hours (50 weeks @ 40 hours per week) = net dividend of $9,200 per year per automatic machine involving only one operator.

As the competitive situation becomes keener, the difference in many close, marginal jobs may be the savings achieved in the finishing room by means of automatic operations.

Where To Look For Savings

In an average spray mask painting operation (nameplates, escutcheons, etc.) requiring sprayers, wipers and inspectors, the cost of materials, such as paints and thinners, probably does not exceed 30 or 40 cents against every dollar spent for labor. *The principal product you are selling from your painting department is labor.*

For this reason, automating your painting operations will

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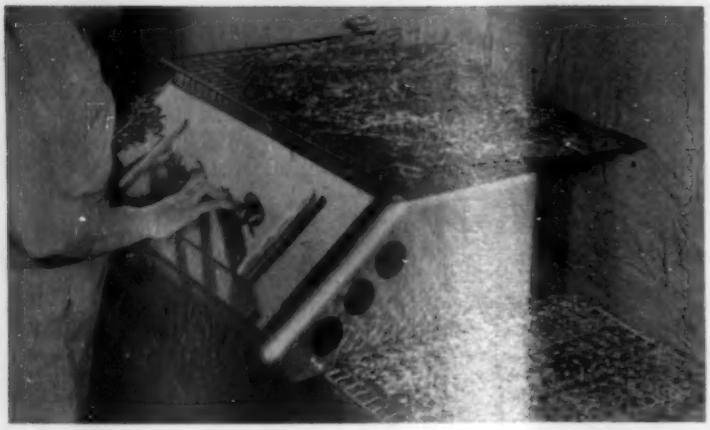

1. SPRAYING A DIE CASTING on an automatic [illegible] mask painting machine. Operator lays workpiece into mask and spray is directed at surface to be painted. Spray gun is mounted on carrier moving parallel to surface painted.

probably net the greatest reduction in production costs, greater perhaps than all other factors.

A thorough understanding among management, methods, time study and finishing department supervisors should be the first step in studying cost reductions. All operations should be charted on the basis of number of parts per hour per operation. This will establish responsibility and credit for cost cutting. A systematic plan should be set up for putting changes into effect, and the results should be charted. Yearly analysis will show astounding savings.

By questioning the paint spray operators on places they may be having difficulty, it is often possible to [illegible] and improve upon an [illegible]. One example was a slow [illegible] spraying a piece that ha[illegible]ous fine characters and req[illegible] complicated spray mask. [illegible]rt was typical of many [illegible] nameplates, dials, trade[illegible]blems, etc.

The [illegible] was having trouble locating [illegible] mask rapidly. The suggested cure was for the operator, while removing the previously painted piece and placing it on the tray, to look for one specific character on the next piece before picking it up, rather than waiting until the part was in hand. An immediate increase of 10 to 15 percent resulted.

Automatic painting rates sometimes exceed even the expected increase over manual methods. A particular case is the finishing of a piece 3" x 6", having a depressed design on nearly half the area to be painted.

This job was quoted at 250 parts per hour by hand spray. In production, the part was put on automatic machines and, with one operator on piece work, production zoomed to 850 per hour.

Here is the cost breakdown:

Cost Study

(Hourly rate estimated @ $1.50 with factory burden of 150% = $3.75/hr.)

Quoted Hand Spray

250/hr. = 4 hrs./M

4 hrs. @ $3.75/hr. = $15/M

Quoted Automatic Spray

500/hr. = 2 hrs./M

2 hrs. @ $3.75/hr. = $7.50/M

Actual Results, Automatic Spray

850/hr. = 1.18 hr/M @ $3.75/hr. = $4.42/M

Annual Saving

8 hrs./day x 850 parts/hr. = 6800 parts/8 hr. shift

6800 x 5 days = 34,000 parts/wk. x $10.58 = $359.72 saved/wk.

$392.72 x 50 work wks/yr. = $17,986.00 saved/yr.

As a footnote, due to the savings in labor, floor space, burden, etc., the unit was paid for in a matter of a few months.

Automatic Spray Mask Painting

Mass production finishing of die castings, molded plastics, stampings and other parts has been

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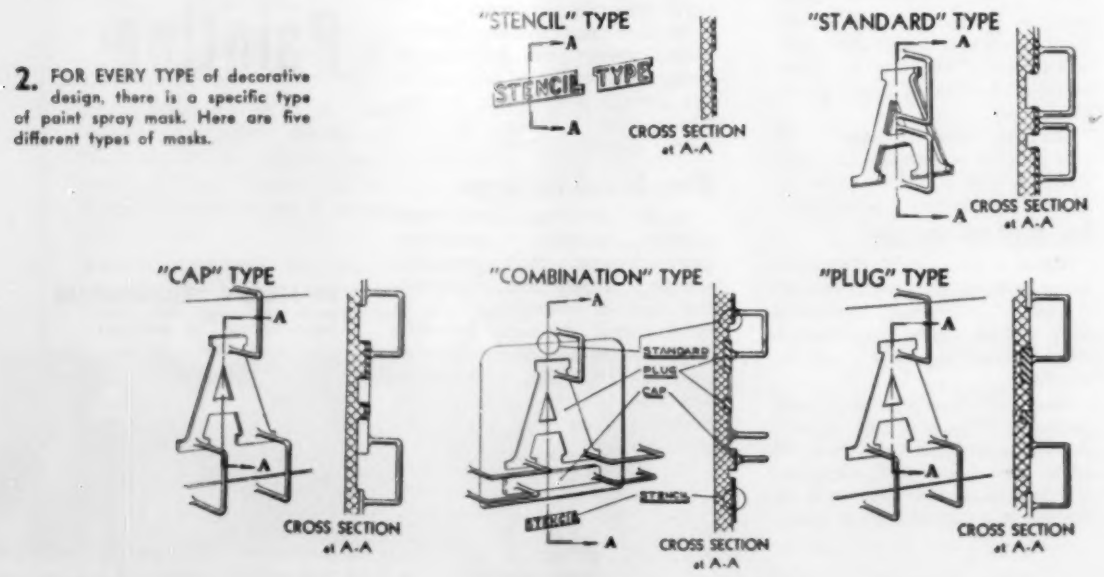

2. FOR EVERY TYPE of decorative design, there is a specific type of paint spray mask. Here are five different types of masks.

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Results? The recommended HONITE procedure eliminated the polishing operation completely, and 60% of the rough grinding hand operation. Finishing time was cut 1½ hours . . . and finishes were improved to a superfine finish.

Your HONITE Methods Engineer or nearby HONITE distributor will show you how *you* can increase production and cut costs, too. Call him today!

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"Don't Buy Too Big A Mask Washer For Your Job . . ."

made necessary by modern high production manufacturing techniques. Hand-operated spray guns and spray masks that range from very simple stencils to highly complicated clamping jigs have been used. Lack of uniformity and waste of paint are drawbacks of these makeshift methods.

The obvious solution of placing a spray gun on a moving carrier and establishing a path of movement parallel to the painting surface was successful for relatively flat open areas; it was not flexible enough for applying a finish from four angular directions to give a uniform coating to raised sections and around obstructions, such as bridges and reinforcements arching over the back of the spray mask.

The cost of such a unit, designed primarily for one particular model, would, in many cases, be too great for industry beset by model changes.

In the automatic spray mask painting machine, Figure 1, means are provided for applying paint to recesses and semi-obstructed surfaces in a manner that reduces waste, such as characterizes random manual spray.

Essentially, the problem of applying paint to these surfaces can be solved by a spray gun carrier that not only moves the guns opposite to the area to be painted, but alters the angular attitude of the guns during transit. This causes paint to be projected around bridges and supports.

In the unit illustrated, the spray guns are enclosed and directed upward to the opening where the spray mask is held in semi-permanent position by locating bars. An unskilled operator can thus place a work piece down upon the painting station in a manner similar to laying an article on a table. The mask is also readily accessible for easy removal for cleaning. This setup saves manual operations and gains in efficiency and uniformity.

Mask Washing Can Also Be Automatic

In cost studies of spraying, it has been found that a large part of each hour is wasted in mask washing when the old soak-and-brush method is used. Automatic mask washing equipment permits full use of the operator's capacity, whether manual or automatic spraying is being done. Great increases in production are possible, just by introduction of such washers.

How should you choose a mask washer? Perhaps the first rule should be what *not* to do. Don't get too large a unit, but fit the washer to the operation. With a unit that is too large, intended to service a number of operators, too much time may be lost taking masks to and from the washer. Small, compact units can be positioned between two operators for convenience; the small washer should have low solvent capacity to minimize fire hazards.

Air-operated units with an automatic cleaning cycle have advantages. With an automatic cycle, there is no danger of leaving a unit operating through negligence. To operate, a valve is depressed, setting a timer for a preset period of 15 to 60 seconds. Upon completing the cycle, the spray shuts off and the solvent returns to a

Continued on page 86

ABOUT THE AUTHOR: Fifteen years ago, Harry Szczepanski started making spray masks, jigs and fixtures and for nearly nine years, has produced electroformed spray masks from nickel under the name of Thierica Studio. He has also designed and built automatic spray mask painting equipment as Sepanski and Associates, having wide experience in setting up this type of equipment for finishing die castings, plastic moldings and other precision parts.

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PROCESSES

Specialists in Short-Run Die Castings: 144
A brochure from a Page & Hall Mfg. Co., Inc. reports on the company's ability to produce short runs of zinc die castings economically. The brochure points out an average tool cost of $530 for 40 typical die cast jobs they have done.

Nickel Alloy Castings: 145
Properties of nickel alloy investment, sand and centrifugal castings are features of a new 16 pg. booklet from International Nickel.

Manual on Aluminum Alloys: 146
Alloy specs, nominal compositions, properties, heat treatment, effect of alloying elements and much other data concerning aluminum alloys are contained in a 60 page handbook from Federated Metals Div., American Smelting & Refining Co. Specific processing of these alloys, such as melting and fluxing of die casting alloys, gas removal, moisture effects, etc., are also included.

Standard Cast Shapes: 147
About 3,000 standard cast shapes: rounds, flat round discs, gear blanks, hexagons, bushings and tubes, rings, channels, squares, etc. in brass, bronze, aluminum and Standardite metal are listed, together with drawings and tabular data, by Standard Foundry Products.

Shell Mold Magnesium Castings: 148
A brochure has been issued by Utica Radiator Corp. describing the facilities for making magnesium castings by conventional sand casting and shell mold casting procedures.

MATERIALS AND EQUIPMENT

Die Casting Machines & Presses: 150
A new buyers' guide and general catalog has been issued by Lake Erie Engineering Co. Incorporated is a comprehensive chart relating the various types of presses to their most suitable production uses. Photos of the casting machines and presses, combined with the chart, aid in simplifying the choice of the most appropriate unit.

Silicone Grease: 151
A six page brochure has been issued by the Dow Corning Corp. describing the properties and uses of a silicone fluid-carbon black mixture designed for high temperature, slow speed bearings.

Metal Powder Data: 152
Two new technical data sheets have been issued by Plastic Metals Div. of National Radiator Co. Two grades of nickel powder are covered. Data given are composition, apparent density, screen analysis and packaging.

Preheat Chart: 153
A preheat chart for use in determining the proper preheat temperature, and the appropriate Tempil or Tempilstick, prior to welding is available from the Tempil Corp. About 80 metals and alloys are covered.

Metal Working Lubricants: 154
Fiske Brothers Refining Co. has just released a new circular on Metal Working Lubricants. The proper lubricant for all types of machine work is given as well as lubricants for drawing, extruding, die casting and hot die work.

Collets for Lathes, Millers, Etc.: 155
A new bulletin has been published by Hardinge Brothers, Inc. The correct collets for some thirty different machines are listed according to sizes with capacity and prices for each.

Catalog of Cemented Carbides: 170
A new catalog has been issued by the Carboloy Dept. of General Electric Co. which lists all of the prices and specifications on standard cemented carbide tools and blanks. Included are specs and prices on throw-away inserts, new saw tips, wood working knife blades, and other shapes.

1955 Lathe Catalog: 171
An all new catalog on lathes and lathe accessories has been issued by the Sheldon Machine Co., Inc. The 24-page booklet includes information and specifications on the Sheldon lathes now in production and also a section on how to select a Sheldon lathe.

Aluminum Application Booklet: 172
The uses of aluminum in the process industries is the subject of a new booklet released by the Aluminum Co. of America. Aluminum uses covered include heat exchanger tubes, coiled tube, steam piping, pipe and fittings, tank cars, bus bars, etc.

Coolants & Lubricants: 173
A booklet published by S. C. Johnson & Son, Inc. describes the company's line of metal working coolants and lubricants. Four pages of the booklet are devoted to cutting fluid charts giving comparative machinery ratings. Data covering machinability percentages with water-type and oil-type cutting fluids are also given.

Roll-Over Furnace for Investment Casting: 174
A special furnace for investment casting, the "roll-over" model, is featured in a data sheet from Ajax Electrothermic Corp., which also includes reference to other types of Ajax melting equipment.

FINISHING

Plating Reference Guide: 157
A new bulletin has been issued by Hanson-Van Winkle-Munning Co. listing the over 260 products of the company under 63 different classifications. A separate section of the bulletin outlines 17 plating and cleaning processes and their applications.

Tumbling Abrasive Catalog: 158
The Simonds Abrasive Co. has published a catalog bulletin describing its Borolon Tumbling Abrasive media. The bulletin describes the proper size and type of abrasive for all sorts of barrel finishing.

Automatic Drill Head: 159
A new descriptive catalog has been issued by The Dumore Co. which describes the new fully automatic Dumore drill head. The bulletin describes the unit and gives many present and suggested applications. A price sheet is included.

Casting Impregnation: 160
A brochure on casting impregnation has been prepared by Western Sealant Co. The process and material described is reported to completely eliminate porosity in castings and to meet specs. for Army, Navy and Airforce contracts.

Continued on next page

WHAT IS YOUR TOUGHEST CLEANING JOB IN AIRCRAFT PRODUCTION?

Does any job in the following list give you trouble? If you'll circle the corresponding number in the coupon, we'll be glad to tell how we can help you.

This list of cleaning (and related) jobs was made up with the advice of several of our customers in aircraft production. It shows, in order of volume, the jobs on which Oakite has most frequently been able to save them time and money. Here it is:

1 Cleaning aluminum, steel and magnesium
2 Stripping paint (solvent or hot tank)
3 Machining, grinding, forming
4 Deoxidizing aluminum
5 Steam cleaning aluminum and steel
6 DeFlocculating paint in spray booths
7 Preparing metal for painting
8 Removing scale and corrosion
9 Preventing corrosion

FREE Our 48-page illustrated booklet "*How to Clean Metals in Aircraft Production*" contains information on all the cleaning jobs in the list.

SPECIALIZED INDUSTRIAL CLEANING
OAKITE
MATERIALS • METHODS • SERVICE

Technical Service Representatives in Principal Cities of U. S. and Canada

OAKITE PRODUCTS, INC.
34G Rector St., New York 6, N. Y.

Send me a **FREE** copy of your booklet "*How to Clean Metals in Aircraft Production.*"

I especially wish to get better results in the jobs indicated by the numbers circled below:

1 2 3 4 5 6 7 8 9

NAME_____

COMPANY_____

ADDRESS_____

For more information circle No. 77 on the Reader Service Card

USEFUL LITERATURE — cont.

Cleaning & Surface Treating: **161**
The cleaning and surface treatment of metals is described and the equipment for that work listed and illustrated in a new catalog from Metalwash Machinery Corp.

Grinders, Arbors, Sanders: **162**
The full line of bench grinders, arbors and sanding discs made by Poly Products Co. is described in a new catalog. Dimensions for mounting, arbor sizes, etc. are given for each unit.

Corrosion Inhibitors: **163**
Engineering data sheets on two new corrosion inhibitors have just been made available by the John B. Moore Corp. One inhibitor forms a film easily removed with an aromatic petroleum solvent while the other one forms a harder, more durable coating.

Vapor Degreasing — Advantages, Equipment: **164**
Why vapor degreasing may be used to remove grease, oil, resin, wax or lubricants from a metal surface before processing, is illustrated in a new bulletin from Ramco Equipment Corp. The Ramco equipment is illustrated.

Masking Materials: **165**
A new bulletin has been issued by W. H. Brady Co. which describes the advantages of pre-cut masks made of pressure sensitive materials. Suggested uses are for all types of painting where masking is needed, sand blasting, tumbling, etc. The same material is recommended for sealing and protective application.

Plating Supplies & Equipment: **166**
The latest edition of the Sel-Rex Newsletter contains informative material on germanium rectifiers, filters and prices on other plating equipment and supplies.

Carbide Tooling: **167**
A new 33 page catalog has just been published by Valenite Metals Corp. listing and describing their carbide tips, tools, throw-away blanks and holders. A feature of the catalog is the carbide equivalent charts to aid in the selection of the proper grade for different applications.

Sensitive Drilling Machine: **168**
The new Edlund Model 1F sensitive drilling machine is the subject of a bulletin from Edlund Machinery Co. Cost-cutting features, such as infinitely variable speed, micrometer graduated depth control, etc., are included.

SPECIALS BECOME "STANDARDS"
Continued from page 37

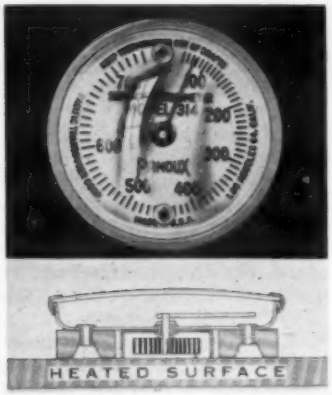
These heat exchanger bonnets must be pressure tight, and this type of dense metal structure is highly suitable for such use. All units are tested at 115 psi hydrostatic pressure.

Another important factor, not to be overlooked in using smooth-surfaced shell mold castings, is appearance. Even in an industrial product, where sale of a product depends upon the ability of a product to perform a given function in the desired manner, surface appearance of the components will help in creating necessary customer confidence.

The shell mold cast bonnets are produced for Kewanee-Ross by two foundries: Lakeside Bronze, Inc., and Metal and Alloy Specialties, Inc. The alloy is a red brass, ASTM B62-52.

to get any of the free materials described here, circle the appropriate number on the reader service cards bound into this issue

PRODUCT NEWS AND DEVELOPMENTS



SMALL SURFACE THERMOMETER
. . . for die temperature

A new surface temperature measuring thermometer that is usable in the range from –50F to 750F has been introduced. The instrument is thermo-dynamically designed to produce an essentially unilateral thermal measuring instrument which indicates the temperature from the back of the instrument only. A highly reflective evaporated mirron on the dial insures the thermal element against external radiation.

For die measurement work, the instrument is supplied with a small magnetic clamp which will hold it securely in place when applying it to steel surfaces. In some applications, a film of silicone grease is applied to the contact surface. This film will not melt and provides an excellent thermal coupling between the instrument and the surface whose temperature is to be measured.

Pacific Transducer Corp.
For more information, circle No. 196 on the Reader Service Card

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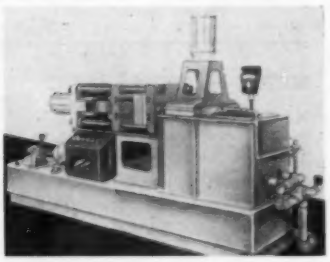

DIE CASTING MACHINE
. . . handles 2½ lb. shot at high speeds

A new, low cost, high speed die casting machine has been announced that will handle shot capacities up to 2½ lbs. The machine is of all-welded construction, 80 tons locking pressure, and automatic electric cycling at speeds of up to 700 shots per hour. The platens are 17-¾ x 17-¾" with a 6½" stroke.

The machine is available air or hydraulically operated plunger goose neck type for zinc, lead, tin or as a cold chamber machine for aluminum, brass and magnesium.

American Die Casting Machinery Co.
For more information, circle No. 198 on the Reader Service Card

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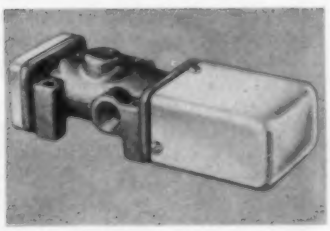

EXPANDED AIR VALVE LINE
. . . has 3 and 4-way units

A new three-way "Bel-Air" valve line has been introduced to complement the four-way valves introduced some time ago. The valves are furnished in ¼", ⅜" and ½" sizes for either manual or electrical control.

On the electrically controlled models the same solenoid can be used for 115, 230, and 440 volts. Mechanically actuated models include hand lever, clevis, roller, foot pedal and treadle types. A torsion spring in the lever bracket returns the valve when pressure is released.

Valve bodies are of cast bronze with chromium plated liners inserted. The stationary liners are separated by protective bronze screens and are sealed to the valve body by "O" rings.

The Bellows Co.
For more information, circle No. 197 on the Reader Service Card

Continued on page 72

IMPROVED CENTRIFUGAL DRIER
. . . speeds barrel plating

One of the time limiting elements of a barrel plating set-up is often the drying of parts after plating and washing. To speed up this phase of the cycle a centrifugal type dryer has been developed.

Not only is centrifugal action used to remove water, but the design of the dryer is such that a continuous stream of air is drawn into the top of the basket, through a heater and then over the parts to be dried.

Other features include a safety cover with an interlock mechanism, an internally expanding brake with a brake pedal that surrounds the entire machine and a totally enclosed ball bearing motor.

Nobles Engineering & Mfg. Co.
For more information, circle No. 199 on the Reader Service Card

NON-METALLIC BLAST
. . . for low cost cleaning

A new non-metallic, dustless blast-cleaning agent that the maker says will permit substantial savings in production time, material cost and blasting equipment maintenance as compared with sand and metallic shot has been announced.

Called Mono-Kleen, the spherical mineral shot, blast cleans uniformly in one pass with no dust clouding the operator's vision and leaving the surface free of grime, film and dust.

The mineral shot flows freely and requires a lower impact velocity, lower blasting pressure and lower power costs.

Baldwin-Hill Co.
For more information, circle No. 200 on the Reader Service Card

SMALL FILTER LUBRICATOR
. . . for single pneumatic units

Individual protection for each cylinder and small pneumatic tool in a plant is offered by a new, fully adjustable, filter lubricator.

The possibility of solid abrasive material reaching the cylinder or tool is avoided since the compact unit is installed directly ahead of the pneumatic equipment it protects. The 40 micron filter element removes all particles larger than 0.0001 average diameter.

The exact lubrication requirements of each unit can be met by the adjustable lubricator element of the new unit. Two separate systems of lubrication provide for positive lubrication even if the primary system fails.

Nu-Jett Products Corp.
For more information, circle No. 201 on the Reader Service Card

METAL-FILLED PLASTIC
. . . for jigs & fixtures

For the rapid production of jigs, fixtures, forming dies, etc. a new metal-filled plastic material has been offered. The material molds like putty to conform to almost any desired shape and then hardened to produce a precision replica of the original. It is said to be particularly useful for making fixtures for odd and irregular shapes which ordinarily may be difficult to hold or position.

To use, the material is poured into a mold or over a pattern and allowed to harden. During the hardening process no pressure is needed and the material gives off no volatile components.

When hardened it is corrosion resistant and is not affected by common cutting oils, solvents, greases, etc. It can be worked with ordinary metal working tools.

Industrial Development & Mfg. Corp.
For more information, circle No. 202 on the Reader Service Card

Bellows
COLLET CONTROLLER

low-cost automatic stock-holding for hollow-spindle lathes and other rotating spindle machines.

★ never stop the machine
★ stock will NOT Slip
★ operate manually or automatically

Take a critical look at your methods of loading and holding work. Are they eating into profit margins by robbing you of valuable machine time? The fractions of seconds wasted while stock is positioned, while collets and holding fixtures are set and reset, total up to an alarming theft of productivity.

The Bellows Collet Controller, powered by a special aluminum non-rotating air cylinder, opens and closes collets faster than the eye can follow. It can be pushbutton controlled or interlocked with other machine elements for automatic operation. The spindle motor of the machine need never be stopped. Holding pressures are always uniform (25 times air pressure applied). Clamping is instantaneous and positive. Mounting is easy. And cost is low.

FOR FULL INFORMATION
Write for
BULLETIN BC-60
ADDRESS DEPT. PMM-455

The Bellows Co.
AKRON 9, OHIO
CONTROLLED-AIR-POWER FOR FASTER, SAFER, BETTER PRODUCTION

For more information circle No. 72 on the Reader Service Card

REDESIGNED AIR CYLINDERS
. . . for longer life

Redesign of one complete line of 26 models of air cylinders, to give improved performance and appearance, has been announced.

The redesign of these cylinders has resulted in longer life, more efficient accurate performance.

Greatly increased bearing surfaces, without increasing cylinder length, gives a steadier ram for more accurate work. Larger diameter return springs assure longer life and more uniform tension. Self-lubricating ram bearings are now used to reduce wear and friction. Other improvements are the use of full floating Hycar synthetic rubber piston cups and a durable, baked-on wrinkle finish outside.

Mead Specialties Co.
For more information, circle No. 205 on the Reader Service Card

PRECISION BARREL FINISHING
. . . has five units

Featuring five units, each designed for a specific application, the Mity-Mite line of barrel finishing machines are said to be highly efficient and specifically designed to fit available floor space.

For wall applications, a 36" double roll unit is available. For center floor space, a 78" single roll unit has been designed. The smallest unit is suited for instrument makers, laboratories and small parts manufacturers. A separate hot sawdust unit has been developed for waxing, polishing and drying of parts. The fifth unit is an unloading and separating cabinet designed to reduce operator fatigue to a minimum.

All units are streamlined and furnished in color combinations to improve overall plant appearance and lessen eye fatigue.

Miller Machine Tool & Gauge Co.
For more information, circle No. 203 on the Reader Service Card

ACID RESISTANT HOOKS
. . . for pickling

A new line of acid-resistant Monel hooks for use in pickling operations has been announced. The hooks are of all welded construction, hairpin-type and feature a specially designed drip trough on the load bar that picks up condensate and carries it out beyond rod bundles.

To meet a wide range of requirements, the hooks are available in two types and six standard sizes. For loads up to 3000 lbs. an "I" section construction is supplied. For heavier loads a box section construction is used. These latter hooks have been used for loads up to 6000 lbs. but can be furnished for almost any capacity.

Lewis Welding & Engineering Corp.
For more information, circle No. 204 on the Reader Service Card

SPRAY DECORATING UNIT
. . . coats convex shapes

A new oscillating gun, pressure contact, spray decorating machine is said to constitute the first means which permits the gun to operate in a concave arc, or pendulum type swing, to coat the outside of convex areas.

The machine is designed to paint areas up to 3 x 6 ins. The gun oscillates continuously to paint either a concave surface, or a convex surface.

Continued on next page

ROTO FINISH

it's the finish that counts!

Roto-Finish maintains exact tolerances on precision parts with no significant dimensional changes. It makes possible a wide range of finishes applicable to parts of almost any size or shape; finishes a variety of materials — at big savings in manpower and costs. Without obligation, send sample unfinished parts to us. Include finished part for guide and your specifications. Roto-Finish will finish parts in its laboratory. You get a complete process report. You are guaranteed results and a finish that counts!

WRITE FOR FACT-PACKED ROTO-FINISH CATALOG NOW

Roto-Finish ROTO FINISH **COMPANY**

3716 Milham Road, Kalamazoo, Michigan
Originators of the Roto-Finish Process

P. O. Box 988
Phone 3-5578

For more information circle No. 79 on the Reader Service Card

THE FINISHING TOUCH

VERSATILITY OF ALUMINUM FINISHES

by A. H. Kirkpatrick
Stevens Special Project Engineer

A look at the 1955 design engineer's drawing board leaves little doubt that aluminum is past adolescence.

Aluminum responds to any number of finishing processes. Polishing and buffing will produce both satin and mirror bright finishes. Barrel Roto-Finishing will remove minor surface irregularities and improve the finish of small castings and forgings.

Stevens L. V. Experimental Aluminum Buffing Operations.

Many chemical and electro-chemical immersion finishing processes, including anodic etching, electroplating, anodizing, electropolishing and bright dipping add versatility to the finishing of aluminum. In anodizing, dyes can be added for brilliant colored finishes.

Aluminum's coming of age makes the task of producing these aluminum finishes a real job for the project engineer.

Stevens Automatic Equipment for bright dipping of aluminum.

Today, increased production, lowered costs and improved finishes, resulting from automatic, **job-qualified**, finishing installations are available to finishers of aluminum through Frederic B. Stevens, Inc. Stevens experience in the field of aluminum finishing ranges—

From the anodizing of refrigerator trays to the coloring of tumblers . . .

From the plating of automotive trim to the buffing of light reflectors . . .

From tumble finishing of aircraft assemblies to the alroking of rivets . . .

Stevens can engineer and build complete automatic or still tank installations for any chemical or electro-immersion aluminum finishing process —furnish the supplies and equip your company to do the best job at **lowest** cost. If it's made of aluminum we know how to finish it. Call in your nearest Stevens representative or write direct to:

FREDERIC B.
STEVENS
INCORPORATED
YOUR METAL FINISHING SUPERMARKET
DETROIT 16, MICHIGAN

circle No. 58 on the Reader Service Card

The arc described by the gun can be adjusted to suit the nature and size of the part. The machine may also be operated with the gun in a stationary position. Placing the part into the mask and depressing the table top about ¼ in. starts the painting operation.

Conforming Matrix Corp.
For more information, circle No. 206 on the Reader Service Card

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NEW BUFFING UNIT
. . . for heavy duty operations

A new heavy-duty, full-floating, adjustable polishing and buffing head and stand has just been announced.

Known as the model 52-100 the stand will accommodate a 10 or 15 HP, 1725 RPM or a 20 HP 3450 RPM motor. New weight of 2500 lbs. indicates the rugged construction necessary for heavy buffing jobs and to insure vibrationless operation resulting in more uniform finishes.

The unit has a maximum float of 6 inches and can be furnished with power feed for vertical lift or horizontal traverse. The head unit can be assembled for either right or left hand operation.

Hammond Machinery Builders, Inc.
For more information, circle No. 207 on the Reader Service Card

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INVESTMENT BONDING MATERIAL
. . . in two grades

Two types of ethyl silicate for bonding investment material are now available. Both are water white materials. Ethyl silicate 40 percent and condensed ethyl silicate 28 percent are the grades being offered.

The silica bonds formed with ethyl silicate will withstand temperatures up to 2000F, are completely insoluble in water, resistant to most chemical attack and are neutral (pH of 7.0)

R. W. Greeff & Co.
For more information, circle No. 208 on the Reader Service Card

COBRA C is the *new* chromate finish for high corrosion protection and bright finish on copper, brass or bronze. Can be used on solid or plated copper or brass; for cleaning and deoxidizing copper or brass parts; for removing flux on soldered parts.

Just *one* advantage of Luster-On COBRA C is that it can be diluted . . . cutting costs for you up to 25% over regular COBRA.

COBRA C eliminates hazardous nitrous oxide fumes that most bright brass treatments give.

COBRA C can be used at room temperatures or slightly elevated.

And, IN ADDITION, COBRA C

- Produces a permanent lustrous finish even in recessed areas.
- Stands over 100 hours standard salt spray; assures long life.
- Can be handled immediately after treatment cycle — no staining or finger marks.
- Replenishment possible with same concentrate.
- Exhaust of bath in use is optional — not required.
- Excellent paint bond qualities.

LUSTER-ON® — the first in the field and still the leader.

Write for full data sheets, and send a part for free processing. L-14

THE Chemical CORPORATION
96 Waltham Ave., Springfield 9, Mass

circle No. 73 on the Reader Service Card

A review of recent U.S.

PATENTS

A METHOD *of recovering zinc metal and zinc base alloy from a zinc dross.* The method consists of agitating the molten dross, at a temperature of about 900 F, with a flux consisting of a mixture of 40 to 55% calcium chloride, 25 to 45% barium chloride and the balance sodium chloride, with a sufficient amount of an alkaline earth fluoride consisting of calcium, strontium and barium fluorides to be stoichiometrically equivalent to between 1 and 5% calcium fluoride.

The agitation is continued until the zinc metal or zinc base alloy has separated from the metal oxides which are held in suspension by the flux. The flux-metal oxide mixture is skimmed off leaving the zinc metal or zinc base alloy substantially free of oxides.

(Patent No. 2,701,194 — Process of Recovering Zinc Metals and Its Alloys From Zinc Dross. Henry C. Deterding — issued Feb. 1, 1955).

A MOLD *composition of the character which is used to produce castings having close tolerance and a fine surface finish and is suitable for casting high melting point alloys containing titanium and aluminum after baking the mold at a temperature above 450F.* The mold composition is essentially 85 to 98% by weight of particles predominantly through 200 mesh of a silicious mineral containing at least 70% aluminum oxide by weight and selected from the class consisting of fused alumina, fused silicious alumina and aluminous mullite, 15 to 2% by weight of a swelling clay, and 25 to 10 parts by weight of water added to 100 parts by weight of the dry ingredients.

(Patent No. 2,701,207 — Mold Composition and Process. Herbert Greenewald, Jr. — issued Feb. 1, 1955).

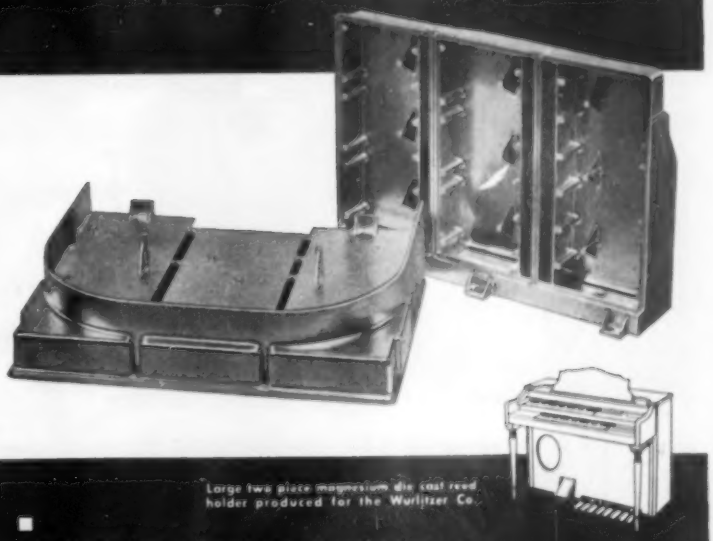
A METHOD *for producing calcium hydride* which comprises forming a reaction product of essentially calcium hydride and sodium chloride by heating anhydrous calcium chloride and sodium metal in a confined reaction zone in an atmosphere of hydrogen to maintain a temperature causing fusion of the chloride mixture present during the reaction.

(Patent No. 2,702,234 — Method For Producing Hydrides of the Alkaline Earth Metals. Peter P. Alexander, assignor to Metal Hydrides, Inc. — issued February 15, 1955).

A PROCESS *of melting pure zirconium metal while maintaining a stable arc to form a sound dense ingot of zirconium,* which comprises passing the arc at a low voltage of about 20 volts direct current in an inert atmosphere between two electrodes at least one of which is a consumable electrode made of pure zirconium metal and containing between about 0.02 and 1.0 percent by weight of a volatilizable metal selected from the class of alkaline earth metals and lithium whereby vapors of the last mentioned metal are formed in sufficient quantity to be electrically conductive at the arc conditions and stabilize the arc to effect quiet melting of the zirconium and pro-

Continued on page 76

ACCURATE Magnesium Die Castings . . . a new note in WURLITZER ORGAN quality



Large two piece magnesium die cast reed holder produced for the Wurlitzer Co.

The change from a heavier metal casting to ACCURATE magnesium die castings reduced weight and production costs for the Wurlitzer Co. Priced competitively with heavier metal castings, these matched magnesium die castings were lighter to handle, machine, and assemble . . . are shock-resistant . . . non-rusting and dimensionally stable. ACCURATE die casting engineers would welcome the opportunity to work with you in adapting magnesium die casting to your product. Write today for recommendations and cost estimates.

Here are a few additional advantages combined in each ACCURATE Magnesium Die Casting:

- Light Weight
- High Strength
- Low Cost
- Fine Surfaces
- Close Tolerance
- Uniformity
- Laboratory Controlled Quality

Major Producer of Aluminum, Zinc and Magnesium Die Castings

ACCURATE DIE CASTING CO.

3089 E. 80th STREET • CLEVELAND 4, OHIO

For more information circle No. 2 on the Reader Service Card

PATENTS — cont.

duce a zirconium ingot substantially free of the last mentioned metal.

(Patent No. 2,702,239 — Process of Arc Melting Zirconium Henry L. Gilbert, et all — issued February 15, 1955).

A PROCESS *for the electrolytic deposition of a member selected from the group consisting of gold and gold copper alloys* predominantly of gold which comprises passing an electrolytic current through an aqueous solution containing an alkaline cyanide and a cyanide of said selected member, and containing, in solution in the bath, a small quantity of a nitro compound selected from the group consisting of nitro-guanidine and nitro-urea.

(Patent No. 2,702,271 — Process for the Deposition of Gold or Gold Alloys—Victor Spreter and Jean Mermillod — issued February 15, 1955).

A METHOD *of applying a strongly adherent hard chromium plating upon an article having a surface of a light metal* selected from the group consisting of aluminum, aluminum base alloys, magnesium and magnesium base alloys which comprises pickling the light metal surface to remove oxides, plating the thus cleaned surface with a thin metal layer of a metal selected from the group consisting of brass, nickel, iron and copper, immersing the plated metal surface into a chromium plating bath, substantially completely dissolving metal layer from light metal surface while immersed in chromium plating bath and then immediately electroplating the surface with hard chromium while still in chromium plating bath.

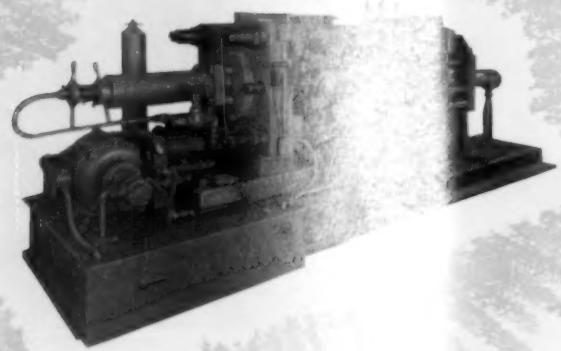
(Patent No. 2,702,785 — Process of Producing Hard Chromium Platings on Light Metals—Paul Eyerund, assignor to Metallgesellschaft Aktiengesellschaft — issued February 22, 1955).

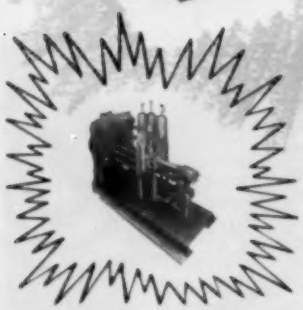
NEW!

TON

DIE CASTIN ACHINE

featuring INFIN JUSTMENT





WHY BE LIST... Midwest-Foster — Newly designed SPEED — HI-PRESSURE injection unit permits infinite adjustment of shot cylinder — easily and quickly up to 6 inches below center.

Revolutionary features include heavy framing and platens, fast clamping action, maximum injection speeds and pressures, hydraulic and electric interlock safety factors, minimum maintenance, all of which contribute to bigger profits for you.

Injection assembly permits safe, efficient ladling of metal. Adjustment of jack screw and 2 gland nuts, simplify positioning of shot cylinder. No additional piping or flexible tubing required.

Write for free detailed bulletin and specifications, fully illustrated.

Midwest MACHINE CO., INC.

Manufacturers of Midwest-Foster Die Casting Machines

2826-28 W. Walnut St. • Chicago 12, Illinois

For more information circle No. 40 on the Reader Service Card

DETROIT ELECTRIC FURNACE EXPANDS SALES DIV.

The Detroit Electric Furnace Division of Kuhlman Electric Company, Bay City, Michigan, recently expanded their sales division with the following:

Brumley-Donaldson Company, with main offices in Los Angeles and a branch office in Oakland, California, was appointed sales representative for the northern half of the state of California. The company, which has represented the Detroit Electric Furnace Division in the southern California district for over a year, now covers the entire state for the Division. J. E. Folsom, sales manager of Brumley-Donaldson, and P. P. Bergman are active on the furnace account.

C. W. Lueders, Jr., with offices in Riverton, N. J., was appointed sales agent for eastern Pennsylvania, southern New Jersey and Maryland. Mr. Lueders specializes in foundry equipment and has a wide and practical experience in foundry work.

CORRECTIONS

The editors of PMM regret the following typographical errors in the March issue of PMM: 1) address of A.B.C. Die Casting Machine Company should have been 400 East 142 St., Dolton, Ill., and 2) new product listing on page 75 for Midwest Machine Co. should have read "Minimum maintenance is required." in referring to a new die casting machine.

OPPORTUNITIES

Rates: $20 for the column inch, $15 for each additional inch payable in advance.

POWDER METALLURGIST WANTED: experienced man to manage the powder metallurgy department of a midwest company. Excellent opportunity for qualified man. Write Box No. 4155, PRECISION METAL MOLDING magazine.

TWO "A" LINE die casting machines for sale. Average 500 shots per hour in production. May be seen in operation. Very reasonable. Write Box No. 4255, PRECISION METAL MOLDING magazine.

FOR SALE: B&T 300 Unit Die Cast Machine, 4-cavity, 8" units. Complete, Priced to sell fast. Hilfinger Corporation, 1800 Westwood Avenue, Toledo, Ohio.

MACHINE DESIGNERS — Die Casting Equipment — As a result of an expansion program of large Midwestern Machine Tool Manufacturer, engineers experienced in die casting machine design and development are needed. Top job available for right man. Write Box 4355, PRECISION METAL MOLDING magazine.

SALES ENGINEER — Die Casting Equipment — Large established manufacturer of die casting machinery wants sales engineers experienced in die casting process and equipment. Write Box No. 4455, PRECISION METAL MOLDING magazine.

WANTED TO PURCHASE, good used cold chamber die casting machine for aluminum. 600 to 750 ton holding. Write Box No. 4555, PRECISION METAL MOLDING magazine.

FOR SALE.

Vacuum Plating Business. Production size, operating at present. Techniques available, personnel available, premises available.

Write Mr. Phillips, 1001 W. Weed St., Chicago 22, Ill.

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Die Castings by MILWAUKEE

...for Extra Values at No Extra Cost!

A pioneer in its field, Milwaukee offers you the experience and knowledge gained in helping others for more than 40 years, to realize the full benefits of the die casting process. In its modern plant, it offers you the most advanced facilities for the production of zinc and aluminum die castings. These extra values which cost you no more, can help you build extra values into your product, too.

We operate under the Certified Zinc Plan of the American Die Casting Institute, Inc.

MILWAUKEE DIE CASTING COMPANY
4146 N. HOLTON STREET • MILWAUKEE 12, WISCONSIN
Established 1909

AUTO-DIESEL PLUNGER RINGS have lasted OVER 122 days

AUTO-DIESEL Hardened Steel Plunger Rings have set amazing records. In one plant they lasted over 122 days — they were immersed in molten zinc over 800 hours. THEY ARE GIVING OVER 100,000 SHOTS IN MANY PLANTS. (Names furnished upon request). Will last for MONTHS instead of HOURS. Made of cast iron, dieloy cast iron or hardened steel. Anyone operating die casting machines or casting zinc parts can save money. It will pay to write for details.

AUTO-DIESEL TWO PIECE PLUNGER SEGMENT RINGS are made to give LONG LIFE

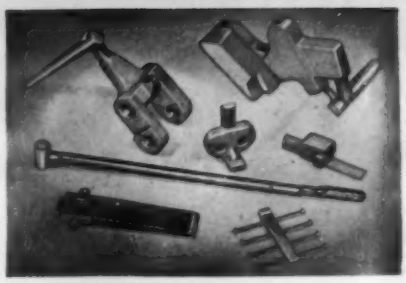
Reduce costly down time by using AUTO-DIESEL Two Piece Plunger Rings. They are made of high grade wear resisting iron to give long useful service. Made in sizes from 1½" to 4" by ⅞". Can make prompt delivery. Write today for prices.

Write for Details

THE AUTO-DIESEL PISTON RING CO.
3135 Superior Avenue • Cleveland 14, Ohio
"RINGS and SHAPES Since 1921"

For more information circle No. 9 on the Reader Service Card

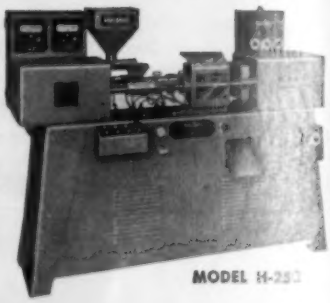
Investment Casters *Prefer* VAN DORNS for molding styrene patterns



Typical precision parts produced by investment casting, using styrene patterns molded to .003" tolerances on Van Dorn Presses.

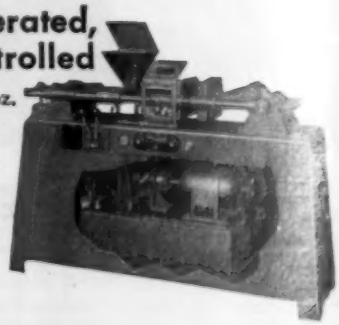
2½ oz. Automatic and 2 oz. Semi-Automatic Presses

These injection presses feature safe, simple push-button controls. Accurate temperature regulation. Rugged, compact, quiet.



MODEL H-250

Power-Operated, Lever-Controlled Presses — 2-oz. or 1-oz. models. Have many automatic and safety features.



MODEL H-200

Plastic Grinder — grinds up waste, rejects, etc., for re-use.

Mold Bases for these presses available from stock.

Write for information on this equipment.

MODEL G-100

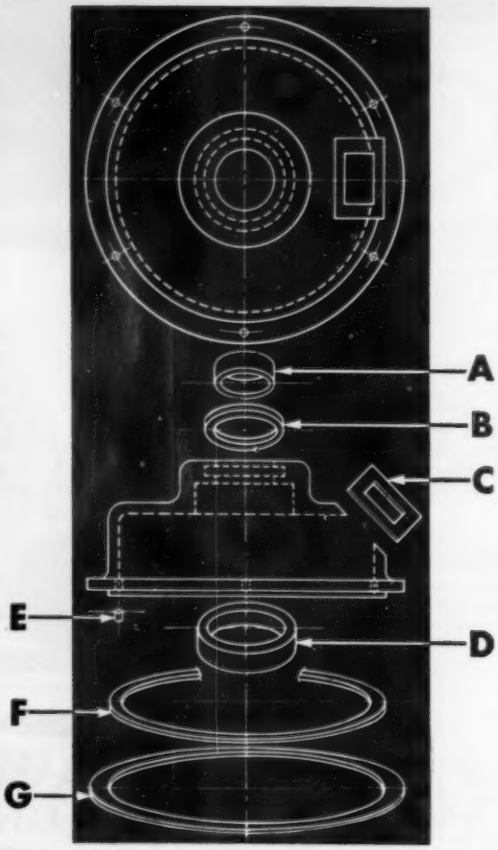
THE VAN DORN IRON WORKS CO.

Cable Address: "VANDORN" Cleveland

2693 East 79th Street · Cleveland 4, Ohio, U. S. A.

For more information circle No. 66 on the Reader Service Card

ENGINEER'S DRAWING DEMONSTRATES SAVINGS EFFECTED BY SHELL MOLDING



MOTOR BELL *Uses Less Metal Requires No Machining*

Parts A, B, C, D, E, F and G above are eliminated by Shell Molded Casting, a saving of as much as 25% in metal. Moreover, the motor bell casting required no machining. Any alloy that can be cast in sand can be shell molded with smooth, sharp as-cast surfaces at less cost. One of our foundries in strategic industrial areas is sure to be near you—write Shell Castings, Inc., P. O. Box 781, Erie, Pa.

IN ANY ALLOY

MAGNESIUM	BRONZES
ALUMINUM	CAST IRON
COPPER	STEEL
BRASSES	(ALL ALLOYS)

SHELL CASTINGS INC.

P.O. BOX 782 ERIE, PA.

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NEWS OF INDUSTRY AND ASSOCIATIONS

AMERICAN ZINC INSTITUTE TO MEET APRIL 28-29

The American Zinc Institute will hold its 37th annual meeting at the Drake Hotel, Chicago, Ill., on Thursday and Friday, April 28 and 29.

On Thursday morning, reviews of the lead and zinc markets, supply and requirements, and mine reserves will be specially featured.

On Thursday afternoon and Friday morning, guest speakers will appraise the general business outlook and Washington news. Reports will also be presented on the 1955 outlook for the products which carry zinc to market including galvanized sheets, die castings, brass goods, and zinc anodes.

INVESTMENT CASTERS TO TELL THEIR STORY TO ATOMIC ENERGY RESEARCH GROUP

If more investment castings are to be used in atomic energy work, the ideas may originate at a special meeting called at Albuquerque, N. M., April 4.

Representatives of the Investment Casting Institute have been invited by the Sandia Corp., central research and development organ of AEC, together with the Albuquerque chapter of the American Society for Metals, to tell the story of investment castings to their engineers and designers.

As one official of Sandia Corp. expresses it, "Orders placed by AEC production agencies for investment castings will be limited only to the extent that Sandia engineers and designers are informed of the advantages of investment castings."

Five phases of investment casting will be discussed in two sessions: "The Investment Casting Process and Its Field of Application," by B. G. Chisholm of Haynes-Stellite Co.; "Investment Casting Alloys," by Walter A. Dubovick, president, Engineered Precision Casting Co.

"Design Factors Applicable to Investment Castings," by J. B. Price of Arwood Precision Casting Corp.; "General System for Quality Control," by Charles Yaker, plant manager, Misco Precision Casting Co.; "Inspection Methods and Cast Test Bars," by B. W. Duncan, chief metallurgist, Alloy Precision Casting Co.

Chairman of the morning session will be J. R. Townsend, director of materials and standards engineering of Sandia Corp., and formerly with Bell Telephone Research Laboratories. Mr. Townsend is chairman of the Materials Advisory Board, National Academy of Sciences, National Research Council; and a director of both the American Standards Association and the American Society for Testing Materials. Chairman of the afternoon session will be provided by the ICI.

RAYMOND DEUTSCH, MONARCH ALUMINUM PRESIDENT, DIES

Raymond Deutsch, founder and president of Monarch Aluminum Mfg. Co., died Sunday, February 27, 1955 in Boca Raton, Florida.

In 1912, Mr. Deutsch organized one of the first commercial aluminum foundries in the United States. The business was incorporated in 1913 as the Monarch Aluminum Ware Company. Mr. Deutsch was the president of this company and served as president of its successor, Monarch Aluminum Mfg. Company until his death.

Under his active leadership, the company expanded into the permanent mold and aluminum die casting field and became one of the world's largest manufacturers of cast aluminum cooking utensils.

At his death, Mr. Deutsch was a vice president of the Aluminum Association. He had been active in the Aluminum Wares Association and other trade associations.

Raymond Deutsch

Mr. Deutsch was a member of the Rotary Club of Cleveland, American Society for Metals, Cleveland Chamber of Commerce, American Ordnance Association and the Armed Forces Chemical Association.

INDUSTRIAL DESIGN FIRM OPENS NEW YORK OFFICE

Expansion of its facilities by the opening of an office in New York has been announced by Sundberg-Ferar, Detroit industrial design firm.

The new eastern office is located at 10 East 49th St., and will be in charge of Richard W. Figgins, account executive for the firm on the International Business Machines Corp. account.

The hob (1) a replica in hard tool steel of the finished piece, is pressed into steel blanks to produce hobbed cavities (2) which are then machined (3) for insertion into a die shoe or mold frame.

CUT TOOL COSTS WITH NEWARK DIE HOBBED CAVITIES

Die hobbing is often the key to lower tool costs. This process produces steel cavities with a minimum of machining, filing and polishing operations . . . and adds the insurance of maximum uniformity in multiple cavity molds or dies.

What's more, as the steel alternately flows and condenses under the hobbing pressure, the mold takes a closer surface grain structure that more faithfully reproduces detail in the finished product.

NEW!

Write for your free copy of "How and When to Hob." Or let us discuss directly how Newark's complete die hobbing facilities and experience with all sizes and types of cavities may benefit you. No obligation, of course.

NEWARK DIE HOBBING AND CASTING CO.

80 SCOTT STREET, NEWARK 2, N. J. PHONE MArket 2-3305

For More Information circle No. 50 on the Reader Service Card

LYNCHBURG SHELL FOUNDRY TO BE COMPLETED BY FALL

A new $1,250,000 addition for the manufacture of shell molded castings is nearing completion at Lynchburg Foundry Co., Lynchburg, Va. Limited production is already in process and the plant will be in full operation by the end of October.

This addition, located at the company's Lynchburg works, is designed to produce gray and nodular iron castings by the newly developed shell molding process on a mass production basis. It is completely mechanized with the most modern equipment available.

Fourteen shell molding stations and complete core facilities with capacity for producing more than 100 tons of castings per day probably make this the largest commercial foundry of its type in the United States. While the design of the casting determines its adaptability to shell molding, castings will be produced weighing from a few ounces up to approximately one hundred pounds.

Two new cupolas have been installed which are equipped with water-cooled protruding tuyeres and hot blast with temperatures up to 1000 F. A special forehearth arrangement is incorporated for the controlled end treatment of various grades of gray iron and the production of nodular iron.

MAGNESIUM PRICES RISE

The Dow Chemical Company has announced that effective Monday, March 21, magnesium prices were increased. The prices were raised $0.010 per pound for AZ91B die casting ingot and $0.015 per pound for primary magnesium and alloy ingot.

Standard grade sheet prices are $0.030 per pound higher on all thicknesses except 0.125" which was increased by $0.015 per pound. Specification grade sheet was increased $0.050 per pound, with special adjustments for certain gauges.

Extrusions were raised in a range generally from $0.020 to $0.080 per pound depending on alloy and shape.

Orders for extruded and rolled products received before March 21 and shipped or scheduled for shipment on or before April 25 will be invoiced at the March 20 price.

Fire Resistant Hydraulic Fluids For Die Casting - Part 5

CHOICE OF PACKING or gasketing material to use with new type hydraulic fluids requires careful consideration. Here, seven different types of hydraulic fluids are discussed, with appropriate packing materials suggested for each.

"WHAT type of packing or gasketing material should I use with a certain type of hydraulic fluid?"

Answers to this question, often asked in connection with the installation and maintenance of hydraulic systems on die casting machines and other industrial equipment, are presented by H. C. Crosland, technical director of the Sirvene Division, Chicago Rawhide Manufacturing Co.

The outline of hydraulic fluids and recommended packing materials for each are listed below, as described by Mr. Crosland in a paper before the National Conference on Industrial Hydraulics in Chicago last Fall, sponsored by the graduate school of Illinois Institute of Technology and its affiliate, Armour Research Foundation.

For each of the available types of fluid, the effect upon certain of the synthetic rubbers is discussed below, and suggestions made concerning the most desirable kinds to use. Best service at lowest cost, it must be emphasized, is obtained by supplying the engineer with all facts surrounding any individual packing problem.

Halogenated hydrocarbons — such as the RPM fluids. Very rough on synthetic rubber packings. A low swell Buna N compound would be the best recommendation when temperature ranges from 0 F. to 250 F. Application should be checked because of possible volume increases of 30% to 40% with this type of fluid. Teflon or Kel-F, correctly designed, can be used with this and any of the other fluids. None appear to affect these two materials, and limitations of their use are physical limitations rather than effect of fluids on them.

Phosphate esters — such as Skydrol or Pydraul. Seals and packings made from butyl rubber or silicone are entirely satisfactory. Tests run as high as 212 F. indicate only nominal volume increase and durometer decrease with these two, properly compounded. Seals recommended for hydrocarbon base fluids are not usable when a switch is made to non-flammable phosphate esters.

Water glycol types — such as Hydrolube and Houghtosafe. Depending on the type of seal required and the temperature range involved, Buna N, neoprene, silicone and butyl all are satisfactory with this class of fluids, which was one of first to reach widespread use. These fluids give little trouble on all types of sealing applications in hydraulic systems, although different brands affect synthetic rubber compounds differently. At 212 F. a volume change of 1% to 25% can be found depending on make of fluid and type of synthetic rubber.

Silicone fluids — Good because of their excellent viscosity index. Sealing these fluids is more a design problem than a compounding one. Most synthetic rubbers will shrink when in contact with silicone fluids. The Buna N materials, low in acrylonitrile content, have a very low shrinkage when in contact with these fluids and appear to lend themselves best to this work. Also helpful are the silicone fluids having viscosities in excess of 100 centipoise because they have less effect on the rubber than those with low viscosities.

Tricresyl phosphate — known also as Lindol HF. Special care must be taken in selecting packing and gasket stocks. Normal applications are adequately taken care of by butyl rubber base synthetic rubbers. Silicone base compounds have been used with great success in some cases. But softening or tenderizing can be expected on both compounds at temperatures above 212 F.

Carbonated diphenyls — of which type Aroclor 1248 is typical. At regular temperatures,

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FOR OVER 50 YEARS

PRODUCERS OF FINEST ZINC DIE CASTINGS

Old in years but modern in production-
STROH facilities for zinc die casting
combines the experience of yesterday
with the vision of tomorrow.
STROH'S superiority has won and held
customers since the turn of the century.

Inquiries Invited!

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Precision Made . . .
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Performance

POWDERED METAL PARTS

precision made from exclusively formulated non-ferrous Sintroloy and Ductiloy are molded to close tolerances, thereby eliminating machining of intricate shape and high scrap loss.

Perhaps we may be able to help you solve specific parts problems. Get in touch with National Molded today for prompt attention.

Write today for detailed information and free literature on cost-saving standard bearings which are available from stock.

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1942 MILL ST. • ST. MARY'S, PA.

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Buna N, GR-S butyl rubber, or silicone base compounds are satisfactory. But the field narrows to silicone base compounds as temperatures are increased. Careful selection of the compound to the application is stressed again here.

Soluble oils — produced by various oil companies. None of these present a particular problem to the rubber compounder. The correct compound can be supplied for each application. Buna N's, neoprenes, and silicones can be used and can be properly sealed through a temperature range of -65 F. to 350 F. with the organic polymers. The temperature range can be enlarged with use of Teflon and Kel-F.

CENTRAL WATER HYDRAULIC SYSTEM CITED BY WORTHINGTON

Centralized water hydraulic systems are becoming popular in die casting operations, according to an executive of Worthington Corp. This new method eliminates the possibility of an individual press shutting down because of oil pump failure.

An authority on this subject, Alvin F. Welsh, manager of Worthington's Reciprocating Pump Division, during a recent interview said, "the obvious trend toward the use of water hydraulic systems by die casting manufacturers is due to such advantages of fire hazard, saving of floor space and the much lower cost of water."

An example of a central system using water is the Precision Castings Company's new plant at Fayetteville, N. Y. which die casts parts for the automotive and the durable goods industries. Several Worthington 2½" x 5" vertical pumps operating at 157 r.p.m. with a resulting displacement of 50 g.p.m., discharge into accumulators at 1000 p.s.i. The intermittent demands of the accumulator system which supplies the hydraulic power for

the die casting machines are provided by these positive displacement pumps electrically controlled by a suction valve unloader installed on the suction side of the pump.

A large automobile manufacturer estimates that with oil hydraulic systems, oil losses per machine are as high as 50 gallons a month. Water, being much cheaper, effects greater operating economy. In the water hydraulic system the water is treated with from one to five percent soluble oil, thus preventing corrosion of moving parts exposed to the pumping liquid.

According to Welsh, in the case of oil hydraulic systems, die casters maintain individual pump and motor units for each machine. The possibility of a high pressure oil leak exists which could throw an atomized spray in the vicinity of the molten metal, thus risking a fire.

A water hydraulic system, it is pointed out, eliminates the incendiary hazard; and the centralization of one, two, or several units consisting of pumps, electric motors, steam turbines or other drives; air compressors; accumulators; and controls — feeding an entire battery of presses, reduces the number of parts.

Welsh explained that his division at Worthington Corporation has been furnishing pumps for handling either oil or water hydraulic systems for many years. "While conversions are not yet widespread, enough manufacturers are changing to the water medium to indicate future conversions throughout the die casting industry," he concluded.

CHRYSLER EXECUTIVE ELECTED TO ASTE GROUP

Election of a Chrysler Corp. executive to the ASTE Research Fund Committee, re-election of the Research Fund chairman and appointment of nominating committees for officers and directors marked the semi-annual board of directors meeting of the American Society of Tool Engineers.

G. W. Trichel, recently named executive vice-president of Chrysler's Amplex Division, was elected to the ASTE Research Fund Committee. The fund fosters research in the broad field of tool engineering aimed at economy of industrial operation.

Trichel joined Chrysler after a long military career which included service as head of the Army's Rocket Development Office and chief ordnance officer for the South Pacific area.

Robert B. Douglas, president of Specialloid, Inc., Ltd., Montreal, Canada, was re-elected chairman of the Research Fund group. Douglas is a past president of the Society.

Joseph P. Crosby, ASTE president, named members of the nominating committees for officers and directors with approval of the board. Crosby is vice-president of The LaPointe Machine Tool Company.

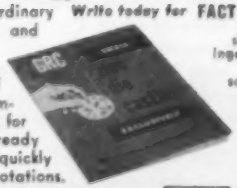
Roger F. Waindle, president of Wai-Met Engineering Co. of Muskegon, Michigan, immediate past president of ASTE, heads both nominating committees.

here's how BIG INDUSTRIES SAVE on SMALL PARTS

GRIES DIE CASTINGS CAN SOLVE YOUR SMALL-PARTS PROBLEMS TOO — IN ONE OPERATION!

GRC zinc alloy die castings open extraordinary possibilities for new designs, products and economies, by producing the most intricate tiny parts in one high-speed operation. Gries offers fast delivery of 100,000 pieces to many millions on completely finished small parts. Write today for bulletin and samples — GRC may already have your problem solved or can solve it quickly and economically. Send prints for quotations.

Write today for FACT-FILLED Bulletin showing how Gries' ingenious, economical operations can solve your problems.



SMALLNESS UNLIMITED
Max. Wt. ½ oz.
Max. Lgth. 1¾"

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World's Foremost Producer of Small Die Castings
157 Beechwood Ave., New Rochelle, N. Y., NEw Rochelle 3-8600

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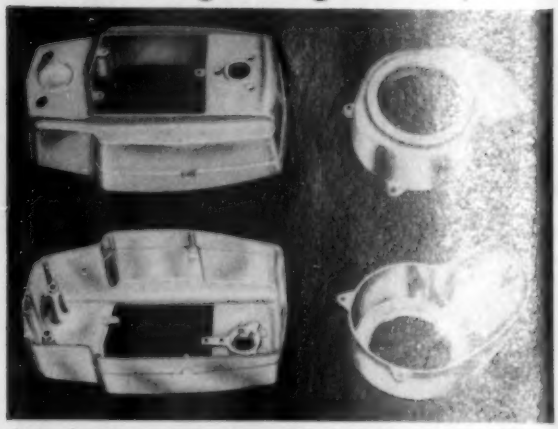
Here's one "Cover-Up" you can't lose on—

ENGINE HOUSINGS
Smoothly Die Cast from Lightweight Alloys



As in the photograph above, Die Castings in smooth, lightweight alloys make ideal Housings, Shrouds and Covers for your Machines. In addition to providing eye-pleasing merchandisable covers, they provide, importantly for the manufacturer, mounting bosses, lugs and cored holes.

Power Products Corp., a major supplier of lightweight engines for power equipment such as: lawn mowers, chain saws, generators and pumps, looks to LITEMETAL for a dependable supply of shrouds for their engines. In addition to the great savings in weight afforded by die castings of aluminum and magnesium, important cost savings are effected through the virtual elimination of machining, finishing and assembling. If you have a "Cover-Up" or any other job that the use of lightweight die castings can fill, look with confidence to LITEMETAL DICAST for meeting your needs.

Let's Talk It Over . . .

LITEMETAL DICAST, INC. is an organization of specialists — men thoroughly experienced in the casting and machining of magnesium and aluminum alloys. Our equipment includes big machines for big jobs — little machines for little jobs . . . the right sizes and types of the most modern die casting equipment for producing parts from the size of a button to large cable spools. Complete facilities for secondary operations are also available.

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A DIVISION OF HAYES INDUSTRIES
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PLANT AND EXECUTIVE OFFICES

For more information circle No. 35 on the Reader Service Card

GERITY-MICHIGAN INSTALLS LARGE AUTOMATIC PLATING MACHINES

In order to handle increased automotive plating business booked Gerity-Michigan Corporation has installed a huge, fully automatic, double plating machine embodying the most advanced and modern developments in dectroplating. Parts ranging from large, front grilles to smaller ornamental and decorative items, which will be on many of the popular 1955 model automobiles, will be automatically plated by the machine.

The new machine is another example of the trend toward automation in the country's mass production industries. It is 160 feet long, 9 feet wide and 16 feet high. It consists of a series of 29 tanks ranging in size from 2⅓ feet to 140 feet in length. The copper plate tank has a solution capacity of 22,000 gallons, a nickel plating tank of 9,000 gallons and a chrome tank of 1,650 gallons. It has a power requirement of 65,000 Amps. at 6 Volts, yet requires only 1 — 20 H.P. motor to activate the entire machine. The water requirements are 2,000 gallons per hour. It is strictly automatic and can be set at any plating speed.

This electroplating machine is a complete and fully automatic mechanism incorporating a vertical transfer and return type work conveying principle which eliminates elevating superstructure, transfer cams, chains and sprockets and hydraulic cylinders above tanks.

Many unique design features combine to make this mechanism a smooth operating, perfectly timed unit requiring but one-half the power of comparable units, a minimum of alignment; one which is simple in operation and maintenance; easily transported and compact enough to fit limited floor and overhead space areas.

All transfer and conveying mechanism is mounted on a reciprocating carriage located between the two rows of tanks. Two basic movements are used to bring parts through the full plating cycle; one forward and reverse straight line horizontal motion and one raising and lowering vertical movement.

Plating racks are attached to work-carriers at the loading station. When the machine is started, lifting arms fixed to the carriage engage the work-carriers being transferred and lift them at all transfer points on one side of the machine, carry them forward to the next station where they are lowered and disengaged from the lifting arm. This sequence is simultaneously produced in reverse by the carriage on the opposite side so that, when the lifting arms are being lowered on one side, they are raised on the other side.

The work load of this automatic plater is usually so perfectly balanced that, when disconnected from the motor the arms on both sides of the carriage come to rest on a level. It is because of this precise balance that so little power is

needed for operation. The smooth action of the conveying and transfer mechanism eliminates the usual jolting movement which shakes parts loose from their racks and necessitates a machine shutdown while these parts are fished from the tanks. All operations of the machine are controlled by one switch.

DATA IN ADS
continued from page 16

73. CHROMATE FINISHING of solid or plated copper or brass to give added surface protection and prevent tarnish is described in engineering reports and data sheets prepared by The Chemical Corp.

74. AUTOMATIC BUFFING the Liquimatic way is described in a fact-filled booklet that has recently been published by Hanson-Van Winkle-Munning Co.

75. BARREL FINISHING by the Honite method to produce superfine finishes is the subject of a booklet from Minnesota Mining & Mfg.

76. POWER TOOL DEBURRING of holes is described in a brochure from Nobur Mfg. Co.

77. CLEANING METALS, particularly for the aircraft industry, is discussed in a series of nine pamphlets prepared by Oakite Products, Inc.

79. RETAIN CLOSE TOLERANCES during finishing through the use of Roto-Finishing barrel methods described in a catalog from the Roto-Finish Co.

B-L-H BUYS HYDROPRESS

As a part of its broad diversification program, the Baldwin-Lima-Hamilton Corp. has announced the purchase of 100 percent of the stock of the Erwin Loewy Hydropress interests and the wholly owned subsidiary, the Loewy Construction Co., Inc. According to the announcement Mr. Loewy will continue as president of the company and Wylie Brown as chairman of the Hydropress and Loewy Construction boards. Headquarters of the two companies will remain in New York City.

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CASTINGS in ALUMINUM

We offer complete service on aluminum permanent mold castings. We also have complete foundry facilities for sand casting aluminum, brass and bronze.

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Design assistance or consulting engineering service on your casting problems.

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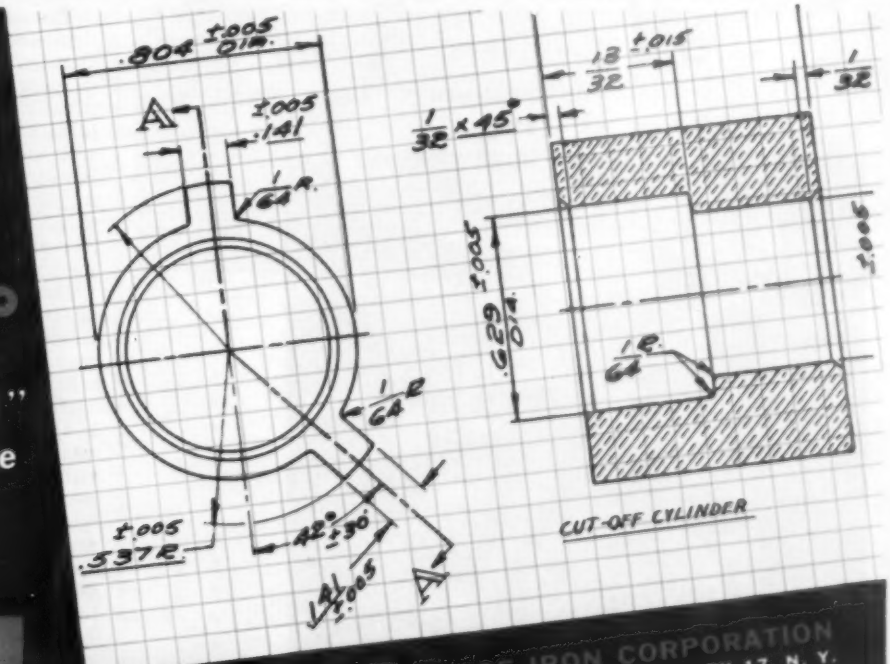

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SPRAY MASK PAINTING
continued from page 68

closed container where it remains until the valve is actuated again.

The washer illustrated in Figure 3 has a spray of solvent at about 100 psi which gets into fine

3. TWO-OPERATOR mask washer. Both of these sprayers use the same washing machine.

crevices and around and under bridging for rapid cleaning of even the most delicate masks.

Spray Masks And How To Use Them

The complex detail of die cast ornament and the complex curves that can be cast, make it essential to employ close-fitting masks formed by electrodeposition. This is the only way in which the close, accurate fit that is needed can be obtained. Either copper or nickel spray masks are produced today, although the greater hardness of the nickel masks increases the life of the mask.

Three masks should be used to maintain a well-balanced cycle: one mask is in use, one is in the washer, and one is drying to be ready for use. When a low-production job of more than one color is applied by one operator, two masks for each color may be sufficient. Use of a single mask is not recommended because breakage would stop production completely.

The different types of paint spray masks are illustrated in Figure 2. Note that each of the five mask types can be used for specific purposes, depending upon the particular pattern of raised and depressed areas to be masked.

Multiple colors can be painted, using spray masks. This is usually accomplished on a production line setup, each color having its own

station. This permits one operator to spray one color continuously. For smaller volume, a single station equipped with drying racks may be preferred. With this system, the entire required volume is sprayed with one color and dried before the next is sprayed.

To obtain masks for these operations, the finisher submits samples of the die cast parts. These should include raw castings with no polishing, and should be examined for dents or nicks not relating to the production run.

For the first mask, the following is required: one raw casting with regular copper and nickel plate, one raw casting with no plate, and one chromium plated casting that has been polished the same as the production run. For subsequent masks, only one additional raw casting, copper-nickel plated, is required per mask.

Pointers On Finishing Materials

Coverage of finishing materials varies according to color. On a chromium surface, the colors rate as follows, according to covering capacity: (1) black, (2) other colors, (3) white.

A satin finish gives much better coverage and more mileage than a gloss finish because the material can stand much heavier loading with pigment. With a gloss finish, maximum loading is limited; too high a percentage of solids will tend to make the surface satiny.

4. PLUG TYPE MASK for spraying detailed lettering and numerals shows how complex a mask is possible.

Material can be improved by two methods: (1) use maximum loading of pigment because it allows thinner paint film, which, in turn, sets up better and allows more layers of paint to be deposited before detail of the mask begins to lose its sharpness; (2) use a faster solvent to mix with the paint, especially if used on an automatic machine. If a material sets up satisfactorily for hand spraying, it will not be satisfactory for automatic spraying. In automatic spraying, the paint deposits on the mask so rapidly it does not have time to set up and, if the proper type of solvent is not used, the paint will run on the mask and require cleaning more often than is necessary.

The principal objective, here, is to spray the maximum number of parts before washing the mask, because cleaning time is nonproductive and should be kept at a minimum.

When operating with hand spray methods on an hourly basis, the quality of the finished products is good, but production is low and mask cleaning is too frequent. Put this on a piece work basis and the output increases, but rejects also are much greater due, generally, to improper positioning of the part in the mask.

With automatic spraying, quality depends on proper setting of the machine without concern for the skill of the operator for maximum mileage and good quality.

Pointers On Thinners

Some companies try blends of solvents for spray mask cleaning

Continued on next page

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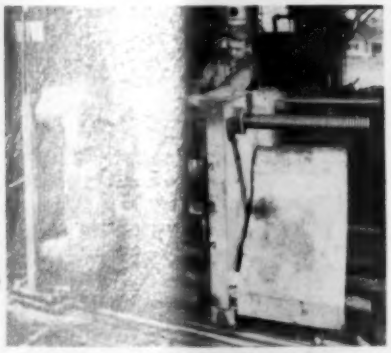

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and lower their solvent costs per gallon. The difficulty in using a low cost blended solvent and reclaiming by distillation is that the vapor points vary, according to the different solvents, and the end product must be recharged back to the original formula.

With blended solvents, it seems difficult to obtain consistent results by reclaiming. By checking various solvents and comparing the cleaning time, loss in evaporation, loss in reclaiming, cost of reclaiming, and the cost of new solvent needed as an additive, a cost per gallon can be computed. This should be far below the cost of new solvent, but in most cases, the higher priced, faster cleaning solvents, will prove to be the most efficient method of operation.

Proper Handling Is Important

The handling of work pieces is of greatest importance. How the work moves to and from the paint station should be carefully studied, whether manual or automatic methods are used.

5. STANDARD AUTOMATIC spray painting machine by Sepanski, shown with a medium sized spray mask washer.

The proper work height should be below elbow-level. An operator who works with his hands raised above that level will tire in a short time.

Parts should be placed in such a position that the operator can readily see and pick up parts without too much turning of the head or body. Parts should always be picked up from the same side, in most small parts operations, and the finished ones placed on the same side. The spray gun, in manual operations, should not be returned to its hanger except when it is necessary for the operator to use both hands, such as removing the spray mask or placing a clean one in the holding fixture.

For automatic painting operations, the handling of materials is even more critical because of the high rate of production. At an automatic rate of 800 pieces per hour, a ten minute loss of time would amount to 160 parts. Whether this loss occurs in a day or an hour, it represents thousands of parts per year.

Since automatic spraying is far superior in efficiency to the old hand spraying method, an operator should not overlook the precision handling and streamlined movements that will help to establish the desired rate of production.

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A special alloys division has been opened by New Jersey Metals Co. Production will be under the direction of Rudolph Leuchtenberger. Mr. Leuchtenberger was formerly production manager of Alloys and Products, Inc. The new division will be located at 712 Rockefeller St., Elizabeth, N. J.

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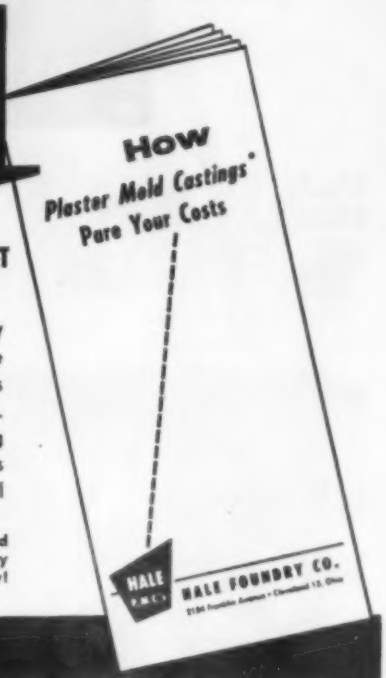

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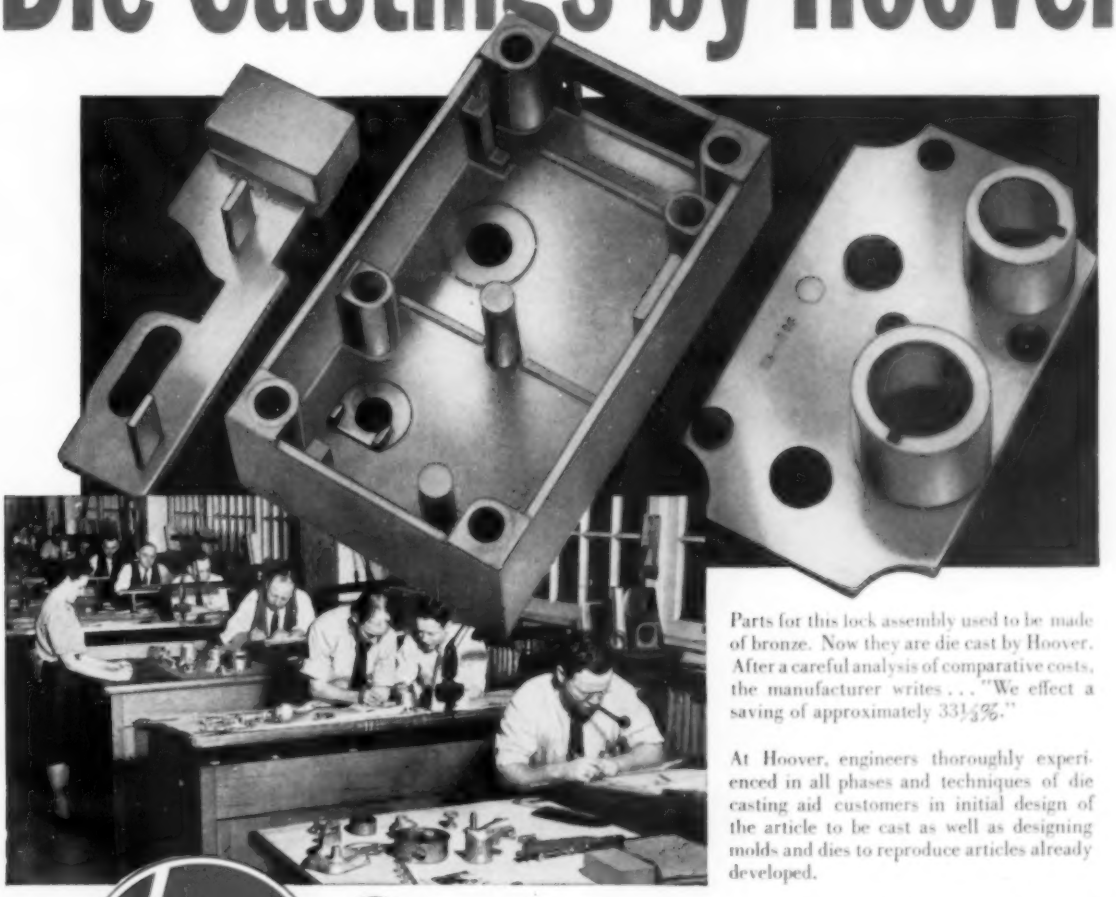

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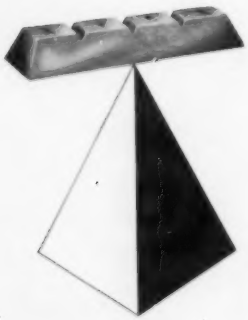

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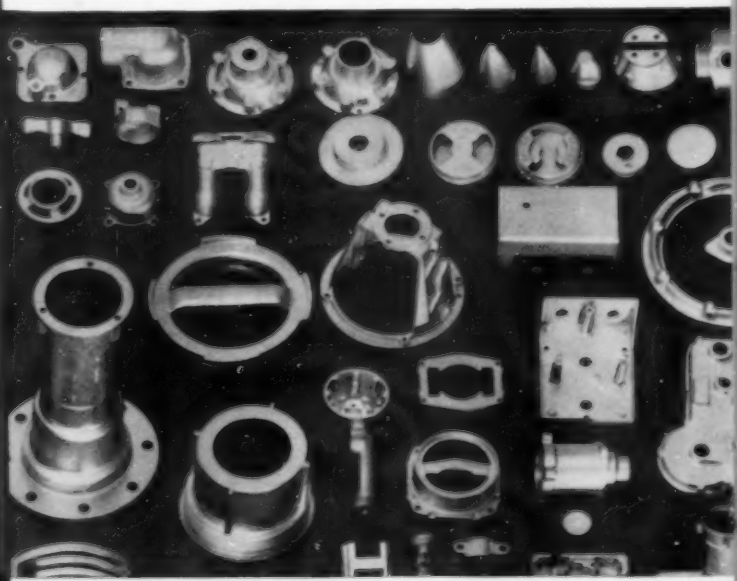

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